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By: Abu-Shawareb, H (Abu-Shawareb, H.); Acree, R (Acree, R.); Adams, P (Adams, P.); Adams, J (Adams, J.); Addis, B (Addis, B.); Aden, R (Aden, R.); Adrian, P (Adrian, P.); Afeyan, BB (Afeyan, B. B.); Aggleton, M (Aggleton, M.); Aghaian, L (Aghaian, L.); Aguirre, A (Aguirre, A.); Aikens, D (Aikens, D.); Akre, J (Akre, J.); Albert, F (Albert, F.); Albrecht, M (Albrecht, M.); Albright, BJ (Albright, B. J.); Albritton, J (Albritton, J.); Alcala, J (Alcala, J.); Alday, C (Alday, C., Jr.); Alessi, DA (Alessi, D. A.); Alexander, N (Alexander, N.); Alfonso, J (Alfonso, J.); Alfonso, N (Alfonso, N.); Alger, E (Alger, E.); Ali, SJ (Ali, S. J.); Ali, ZA (Ali, Z. A.); Alley, WE (Alley, W. E.); Amala, P (Amala, P.); Amendt, PA (Amendt, P. A.); Amick, P (Amick, P.); Ammula, S (Ammula, S.); Amorin, C (Amorin, C.); Ampleford, DJ (Ampleford, D. J.); Anderson, RW (Anderson, R. W.); Anklam, T (Anklam, T.); Antipa, N (Antipa, N.); Appelbe, B (Appelbe, B.); Aracne-Ruddle, C (Aracne-Ruddle, C.); Araya, E (Araya, E.); Arend, M (Arend, M.); Arnold, P (Arnold, P.); Arnold, T (Arnold, T.); Asay, J (Asay, J.); Atherton, LJ (Atherton, L. J.); Atkinson, D (Atkinson, D.); Atkinson, R (Atkinson, R.); Auerbach, JM (Auerbach, J. M.); Austin, B (Austin, B.); Auyang, L (Auyang, L.); Awwal, AS (Awwal, A. S.); Ayers, J (Ayers, J.); Ayers, S (Ayers, S.); Ayers, T (Ayers, T.); Azevedo, S (Azevedo, S.); Bachmann, B (Bachmann, B.); Back, CA (Back, C. A.); Bae, J (Bae, J.); Bailey, DS (Bailey, D. S.); Bailey, J (Bailey, J.); Baisden, T (Baisden, T.); Baker, KL (Baker, K. L.); Baldis, H (Baldis, H.); Barber, D (Barber, D.); Barberis, M (Barberis, M.); Barker, D (Barker, D.); Barnes, A (Barnes, A.); Barnes, CW (Barnes, C. W.); Barrios, MA (Barrios, M. A.); Barty, C (Barty, C.); Bass, I (Bass, I); Batha, SH (Batha, S. H.); Baxamusa, SH (Baxamusa, S. H.); Bazan, G (Bazan, G.); Beagle, JK (Beagle, J. K.); Beale, R (Beale, R.); Beck, BR (Beck, B. R.); Beck, JB (Beck, J. B.); Bedzyk, M (Bedzyk, M.); Beeler, RG (Beeler, R. G., II); Beeler, RG (Beeler, R. G., III); Behrendt, W (Behrendt, W.); Belk, L (Belk, L.); Bell, P (Bell, P.); Belyaev, M (Belyaev, M.); Benage, JF (Benage, J. F.); Bennett, G (Bennett, G.); Benedetti, LR (Benedetti, L. R.); Benedict, LX (Benedict, L. X.); Berger, R (Berger, R.); Bernat, T (Bernat, T.); Bernstein, LA (Bernstein, L. A.); Berry, B (Berry, B.); Bertolini, L (Bertolini, L.); Besenbruch, G (Besenbruch, G.); Betcher, J (Betcher, J.); Bettenhausen, R (Bettenhausen, R.); Betti, R (Betti, R.); Bezzerides, B (Bezzerides, B.); Bhandarkar, SD (Bhandarkar, S. D.); Bickel, R (Bickel, R.); Biener, J (Biener, J.); Biesiada, T (Biesiada, T.); Bigelow, K (Bigelow, K.); Bigelow-Granillo, J (Bigelow-Granillo, J.); Bigman, V (Bigman, V); Bionta, RM (Bionta, R. M.); Birge, NW (Birge, N. W.); Bitter, M (Bitter, M.); Black, AC (Black, A. C.); Bleile, R (Bleile, R.); Bleuel, DL (Bleuel, D. L.); Bliss, E (Bliss, E.); Bliss, E (Bliss, E.); Blue, B (Blue, B.); Boehly, T (Boehly, T.); Boehm, K (Boehm, K.); Boley, CD (Boley, C. D.); Bonanno, R (Bonanno, R.); Bond, EJ (Bond, E. J.); Bond, T (Bond, T.); Bonino, MJ (Bonino, M. J.); Borden, M (Borden, M.); Bourgade, JL (Bourgade, J-L); Bousquet, J (Bousquet, J.); Bowers, J (Bowers, J.); Bowers, M (Bowers, M.); Boyd, R (Boyd, R.); Bozek, A (Bozek, A.); Bradley, DK (Bradley, D. K.); Bradley, KS (Bradley, K. S.); Bradley, PA (Bradley, P. A.); Bradley, L (Bradley, L.); Brannon, L (Brannon, L.); Brantley, PS (Brantley, P. S.); Braun, D (Braun, D.); Braun, T (Braun, T.); Brienza-Larsen, K (Brienza-Larsen, K.); Briggs, TM (Briggs, T. M.); Britten, J (Britten, J.); Brooks, ED (Brooks, E. D.); Browning, D (Browning, D.); Bruhn, MW (Bruhn, M. W.); Brunner, TA (Brunner, T. A.); Bruns, H (Bruns, H.); Brunton, G (Brunton, G.); Bryant, B (Bryant, B.); Buczek, T (Buczek, T.); Bude, J (Bude, J.); Buitano, L (Buitano, L.); Burkhart, S (Burkhart, S.); Burmark, J (Burmark, J.); Burnham, A (Burnham, A.); Burr, R (Burr, R.); Busby, LE (Busby, L. E.); Butlin, B (Butlin, B.); Cabeltis, R (Cabeltis, R.); Cable, M (Cable, M.); Cabot, WH (Cabot, W. H.); Cagadas, B (Cagadas, B.); Caggiano, J (Caggiano, J.); Cahayag, R (Cahayag, R.); Caldwell, SE (Caldwell, S. E.); Calkins, S (Calkins, S.); Callahan, DA (Callahan, D. A.); Calleja-Aguirre, J (Calleja-Aguirre, J.); Camara, L (Camara, L.); Camp, D (Camp, D.); Campbell, EM (Campbell, E. M.); Campbell, JH (Campbell, J. H.); Carey, B (Carey, B.); Carey, R (Carey, R.); Carlisle, K (Carlisle, K.); Carlson, L (Carlson, L.); Carman, L (Carman, L.); Carmichael, J (Carmichael, J.); Carpenter, A (Carpenter, A.); Carr, C (Carr, C.); Carrera, JA (Carrera, J. A.); Casavant, D (Casavant, D.); Casey, A (Casey, A.); Casey, DT (Casey, D. T.); Castillo, A (Castillo, A.); Castillo, E (Castillo, E.); Castor, JI (Castor, J., I); Castro, C (Castro, C.); Caughey, W (Caughey, W.); Cavitt, R (Cavitt, R.); Celeste, J (Celeste, J.); Celliers, PM (Celliers, P. M.); Cerjan, C (Cerjan, C.); Chandler, G (Chandler, G.); Chang, B (Chang, B.); Chang, C (Chang, C.); Chang, J (Chang, J.); Chang, L (Chang, L.); Chapman, R (Chapman, R.); Chapman, T (Chapman, T.); Chase, L (Chase, L.); Chen, H (Chen, H.); Chen, H (Chen, H.); Chen, K (Chen, K.); Chen, LY (Chen, L-Y); Cheng, B (Cheng, B.); Chittenden, J (Chittenden, J.); Choate, C (Choate, C.); Chou, J (Chou, J.); Chrien, RE (Chrien, R. E.); Chrisp, M (Chrisp, M.); Christensen, K (Christensen, K.); Christensen, M (Christensen, M.); Christopherson, AR (Christopherson, A. R.); Chung, M (Chung, M.); Church, JA (Church, J. A.);

Clark, A (Clark, A.); Clark, DS (Clark, D. S.); Clark, K (Clark, K.); Clark, R (Clark, R.); Claus, L (Claus, L.); Cline, B (Cline, B.); Cline, JA (Cline, J. A.); Cobble, JA (Cobble, J. A.); Cochrane, K (Cochrane, K.); Cohen, B (Cohen, B.); Cohen, S (Cohen, S.); Collette, MR (Collette, M. R.); Collins, G (Collins, G.); Collins, LA (Collins, L. A.); Collins, TJB (Collins, T. J. B.); Conder, A (Conder, A.); Conrad, B (Conrad, B.); Conyers, M (Conyers, M.); Cook, AW (Cook, A. W.); Cook, D (Cook, D.); Cook, R (Cook, R.); Cooley, JC (Cooley, J. C.); Cooper, G (Cooper, G.); Cope, T (Cope, T.); Copeland, SR (Copeland, S. R.); Coppari, F (Coppari, F.); Cortez, J (Cortez, J.); Cox, J (Cox, J.); Crandall, DH (Crandall, D. H.); Crane, J (Crane, J.); Craxton, RS (Craxton, R. S.); Cray, M (Cray, M.); Crilly, A (Crilly, A.); Crippen, JW (Crippen, J. W.); Cross, D (Cross, D.); Cuneo, M (Cuneo, M.); Cuotts, G (Cuotts, G.); Czajka, CE (Czajka, C. E.); Czechowicz, D (Czechowicz, D.); Daly, T (Daly, T.); Danforth, P (Danforth, P.); Darbee, R (Darbee, R.); Darlington, B (Darlington, B.); Datte, P (Datte, P.); Dauffy, L (Dauffy, L.); Davalos, G (Davalos, G.); Davidovits, S (Davidovits, S.); Davis, P (Davis, P.); Davis, J (Davis, J.); Dawson, S (Dawson, S.); Day, RD (Day, R. D.); Day, TH (Day, T. H.); Dayton, M (Dayton, M.); Deck, C (Deck, C.); Decker, C (Decker, C.); Deeney, C (Deeney, C.); DeFriend, KA (DeFriend, K. A.); Deis, G (Deis, G.); Delamater, ND (Delamater, N. D.); Delettrez, JA (Delettrez, J. A.); Demaret, R (Demaret, R.); Demos, S (Demos, S.); Dempsey, SM (Dempsey, S. M.); Desjardin, R (Desjardin, R.); Desjardins, T (Desjardins, T.); Desjarlais, MP (Desjarlais, M. P.); Dewald, EL (Dewald, E. L.); DeYoreo, J (DeYoreo, J.); Diaz, S (Diaz, S.); Dimonte, G (Dimonte, G.); Dittrich, TR (Dittrich, T. R.); Divol, L (Divol, L.); Dixit, SN (Dixit, S. N.); Dixon, J (Dixon, J.); Dodd, ES (Dodd, E. S.); Dolan, D (Dolan, D.); Donovan, A (Donovan, A.); Donovan, M (Donovan, M.); Doppner, T (Doppner, T.); Dorrer, C (Dorrer, C.); Dorsano, N (Dorsano, N.); Douglas, MR (Douglas, M. R.); Dow, D (Dow, D.); Downie, J (Downie, J.); Downing, E (Downing, E.); Dozieres, M (Dozieres, M.); Draggoo, V (Draggoo, V); Drake, D (Drake, D.); Drake, RP (Drake, R. P.); Drake, T (Drake, T.); Dreifuerst, G (Dreifuerst, G.); DuBois, DF (DuBois, D. F.); DuBois, PF (DuBois, P. F.); Dunham, G (Dunham, G.); Dylla-Spears, R (Dylla-Spears, R.); Dymoke-Bradshaw, AKL (Dymoke-Bradshaw, A. K. L.); Dzenitis, B (Dzenitis, B.); Ebbers, C (Ebbers, C.); Eckart, M (Eckart, M.); Eddinger, S (Eddinger, S.); Eder, D (Eder, D.); Edgell, D (Edgell, D.); Edwards, MJ (Edwards, M. J.); Efthimion, P (Efthimion, P.); Eggert, JH (Eggert, J. H.); Ehrlich, B (Ehrlich, B.); Ehrmann, P (Ehrmann, P.); Elhadj, S (Elhadj, S.); Ellerbee, C (Ellerbee, C.); Elliott, NS (Elliott, N. S.); Ellison, CL (Ellison, C. L.); Elsner, F (Elsner, F.); Emerich, M (Emerich, M.); Engelhorn, K (Engelhorn, K.); England, T (England, T.); English, E (English, E.); Epperson, P (Epperson, P.); Epstein, R (Epstein, R.); Erbert, G (Erbert, G.); Erickson, MA (Erickson, M. A.); Erskine, DJ (Erskine, D. J.); Erlandson, A (Erlandson, A.); Espinosa, RJ (Espinosa, R. J.); Estes, C (Estes, C.); Estabrook, KG (Estabrook, K. G.); Evans, S (Evans, S.); Fabyan, A (Fabyan, A.); Fair, J (Fair, J.); Fallejo, R (Fallejo, R.); Farmer, N (Farmer, N.); Farmer, WA (Farmer, W. A.); Farrell, M (Farrell, M.); Fatherley, VE (Fatherley, V. E.); Fedorov, M (Fedorov, M.); Feigenbaum, E (Feigenbaum, E.); Feit, M (Feit, M.); Ferguson, W (Ferguson, W.); Fernandez, JC (Fernandez, J. C.); Fernandez-Panella, A (Fernandez-Panella, A.); Fess, S (Fess, S.); Field, JE (Field, J. E.); Filip, CV (Filip, C., V); Fincke, JR (Fincke, J. R.); Finn, T (Finn, T.); Finnegan, SM (Finnegan, S. M.); Finucane, RG (Finucane, R. G.); Fischer, M (Fischer, M.); Fisher, A (Fisher, A.); Fisher, J (Fisher, J.); Fishler, B (Fishler, B.); Fittinghoff, D (Fittinghoff, D.); Fitzsimmons, P (Fitzsimmons, P.); Flegel, M (Flegel, M.); Flippo, KA (Flippo, K. A.); Florio, J (Florio, J.); Folta, J (Folta, J.); Folta, P (Folta, P.); Foreman, LR (Foreman, L. R.); Forrest, C (Forrest, C.); Forsman, A (Forsman, A.); Fooks, J (Fooks, J.); Foord, M (Foord, M.); Fortner, R (Fortner, R.); Fournier, K (Fournier, K.); Fratanduono, DE (Fratanduono, D. E.); Frazier, N (Frazier, N.); Frazier, T (Frazier, T.); Frederick, C (Frederick, C.); Freeman, MS (Freeman, M. S.); Frenje, J (Frenje, J.); Frey, D (Frey, D.); Frieders, G (Frieders, G.); Friedrich, S (Friedrich, S.); Froula, DH (Froula, D. H.); Fry, J (Fry, J.); Fuller, T (Fuller, T.); Gaffney, J (Gaffney, J.); Gales, S (Gales, S.); Le Galloudec, B (Le Galloudec, B.); Le Galloudec, KK (Le Galloudec, K. K.); Gambhir, A (Gambhir, A.); Gao, L (Gao, L.); Garbett, WJ (Garbett, W. J.); Garcia, A (Garcia, A.); Gates, C (Gates, C.); Gaut, E (Gaut, E.); Gauthier, P (Gauthier, P.); Gavin, Z (Gavin, Z.); Gaylord, J (Gaylord, J.); Geissel, M (Geissel, M.); Genin, F (Genin, F.); Georgeson, J (Georgeson, J.); Geppert-Kleinrath, H (Geppert-Kleinrath, H.); Geppert-Kleinrath, V (Geppert-Kleinrath, V); Gharibyan, N (Gharibyan, N.); Gibson, J (Gibson, J.); Gibson, C (Gibson, C.); Giraldez, E (Giraldez, E.); Glebov, V (Glebov, V); Glendinning, SG (Glendinning, S. G.); Glenn, S (Glenn, S.); Glenzer, SH (Glenzer, S. H.); Goade, S (Goade, S.); Gobby, PL (Gobby, P. L.); Goldman, SR (Goldman, S. R.); Golick, B (Golick, B.); Gomez, M (Gomez, M.); Goncharov, V (Goncharov, V); Goodin, D (Goodin, D.); Grabowski, P (Grabowski, P.); Grafil, E (Grafil, E.); Graham, P (Graham, P.); Grandy, J (Grandy, J.); Grasz, E (Grasz, E.); Graziani, F (Graziani, F.); Greenman, G (Greenman, G.); Greenough, JA (Greenough, J. A.); Greenwood, A (Greenwood, A.); Gregori, G (Gregori, G.); Green, T (Green, T.); Griego, JR (Griego, J. R.); Grim, GP (Grim, G. P.); Grondalski, J (Grondalski, J.); Gross, S (Gross, S.); Guckian, J (Guckian, J.); Guler, N (Guler, N.); Gunney, B (Gunney, B.); Guss, G (Guss, G.); Haan, S (Haan, S.); Hackbarth, J (Hackbarth, J.); Hackel, L (Hackel, L.); Hackel, R (Hackel, R.); Haefner, C (Haefner, C.); Hagmann, C (Hagmann, C.); Hahn, KD (Hahn, K. D.); Hahn, S (Hahn, S.); Haid, BJ (Haid, B. J.); Haines, BM (Haines, B. M.); Hall, BM (Hall, B. M.); Hall, C (Hall, C.); Hall, GN (Hall, G. N.); Hamamoto, M (Hamamoto, M.); Hamel, S (Hamel, S.); Hamilton, CE (Hamilton, C. E.); Hammel, BA (Hammel, B. A.); Hammer, JH (Hammer, J. H.); Hampton, G (Hampton, G.); Hamza, A (Hamza, A.); Handler, A (Handler, A.); Hansen, S

(Hansen, S.); Hanson, D (Hanson, D.); Haque, R (Haque, R.); Harding, D (Harding, D.); Harding, E (Harding, E.); Hares, JD (Hares, J. D.); Harris, DB (Harris, D. B.); Harte, JA (Harte, J. A.); Hartouni, EP (Hartouni, E. P.); Hatarik, R (Hatarik, R.); Hatchett, S (Hatchett, S.); Hauer, AA (Hauer, A. A.); Havre, M (Havre, M.); Hawley, R (Hawley, R.); Hayes, J (Hayes, J.); Hayes, J (Hayes, J.); Hayes, S (Hayes, S.); Hayes-Sterbenz, A (Hayes-Sterbenz, A.); Haynam, CA (Haynam, C. A.); Haynes, DA (Haynes, D. A.); Headley, D (Headley, D.); Heal, A (Heal, A.); Heebner, JE (Heebner, J. E.); Heerey, S (Heerey, S.); Heestand, GM (Heestand, G. M.); Heeter, R (Heeter, R.); Hein, N (Hein, N.); Heinbockel, C (Heinbockel, C.); Hendricks, C (Hendricks, C.); Henesian, M (Henesian, M.); Heninger, J (Heninger, J.); Henrikson, J (Henrikson, J.); Henry, EA (Henry, E. A.); Herbold, EB (Herbold, E. B.); Hermann, MR (Hermann, M. R.); Hermes, G (Hermes, G.); Hernandez, JE (Hernandez, J. E.); Hernandez, VJ (Hernandez, V. J.); Herrmann, MC (Herrmann, M. C.); Herrmann, HW (Herrmann, H. W.); Herrera, OD (Herrera, O. D.); Hewett, D (Hewett, D.); Hibbard, R (Hibbard, R.); Hicks, DG (Hicks, D. G.); Hill, D (Hill, D.); Hill, K (Hill, K.); Hilsabeck, T (Hilsabeck, T.); Hinkel, DE (Hinkel, D. E.); Ho, DD (Ho, D. D.); Ho, VK (Ho, V. K.); Hoffer, JK (Hoffer, J. K.); Hoffman, NM (Hoffman, N. M.); Hohenberger, M (Hohenberger, M.); Hohensee, M (Hohensee, M.); Hoke, W (Hoke, W.); Holdener, D (Holdener, D.); Holdener, F (Holdener, F.); Holder, JP (Holder, J. P.); Holko, B (Holko, B.); Holunga, D (Holunga, D.); Holzrichter, JF (Holzrichter, J. F.); Honig, J (Honig, J.); Hoover, D (Hoover, D.); Hopkins, D (Hopkins, D.); Hopkins, LB (Hopkins, L. Berzak); Hoppe, M (Hoppe, M., Jr.); Hoppe, ML (Hoppe, M. L., Sr.); Horner, J (Horner, J.); Hornung, R (Hornung, R.); Horsfield, CJ (Horsfield, C. J.); Horvath, J (Horvath, J.); Hotaling, D (Hotaling, D.); House, R (House, R.); Howell, L (Howell, L.); Hsing, WW (Hsing, W. W.); Hu, SX (Hu, S. X.); Huang, H (Huang, H.); Huckins, J (Huckins, J.); Hui, H (Hui, H.); Humbird, KD (Humbird, K. D.); Hund, J (Hund, J.); Hunt, J (Hunt, J.); Hurricane, OA (Hurricane, O. A.); Hutton, M (Hutton, M.); Huynh, KHK (Huynh, K. H-K); Inandan, L (Inandan, L.); Iglesias, C (Iglesias, C.); Igumenshchev, IV (Igumenshchev, I., V); Izumi, N (Izumi, N.); Jackson, M (Jackson, M.); Jackson, J (Jackson, J.); Jacobs, SD (Jacobs, S. D.); James, G (James, G.); Jancaitis, K (Jancaitis, K.); Jarboe, J (Jarboe, J.); Jarrott, LC (Jarrott, L. C.); Jasion, D (Jasion, D.); Jaquez, J (Jaquez, J.); Jeet, J (Jeet, J.); Jenei, AE (Jenei, A. E.); Jensen, J (Jensen, J.); Jimenez, J (Jimenez, J.); Jimenez, R (Jimenez, R.); Jobe, D (Jobe, D.); Johal, Z (Johal, Z.); Johns, HM (Johns, H. M.); Johnson, D (Johnson, D.); Johnson, MA (Johnson, M. A.); Johnson, MG (Johnson, M. Gatu); Johnson, RJ (Johnson, R. J.); Johnson, S (Johnson, S.); Johnson, SA (Johnson, S. A.); Johnson, T (Johnson, T.); Jones, K (Jones, K.); Jones, O (Jones, O.); Jones, M (Jones, M.); Jorge, R (Jorge, R.); Jorgenson, HJ (Jorgenson, H. J.); Julian, M (Julian, M.); Jun, BI (Jun, B., I); Jungquist, R (Jungquist, R.); Kaae, J (Kaae, J.); Kabadi, N (Kabadi, N.); Kaczala, D (Kaczala, D.); Kalantar, D (Kalantar, D.); Kangas, K (Kangas, K.); Karasiev, VV (Karasiev, V. V.); Karasik, M (Karasik, M.); Karpenko, V (Karpenko, V); Kasarky, A (Kasarky, A.); Kasper, K (Kasper, K.); Kauffman, R (Kauffman, R.); Kaufman, MI (Kaufman, M., I); Keane, C (Keane, C.); Keaty, L (Keaty, L.); Kegelmeyer, L (Kegelmeyer, L.); Keiter, PA (Keiter, P. A.); Kellett, PA (Kellett, P. A.); Kellogg, J (Kellogg, J.); Kelly, JH (Kelly, J. H.); Kemic, S (Kemic, S.); Kemp, AJ (Kemp, A. J.); Kemp, GE (Kemp, G. E.); Kerbel, GD (Kerbel, G. D.); Kershaw, D (Kershaw, D.); Kerr, SM (Kerr, S. M.); Kessler, TJ (Kessler, T. J.); Key, MH (Key, M. H.); Khan, SF (Khan, S. F.); Khater, H (Khater, H.); Kiikka, C (Kiikka, C.); Kilkenny, J (Kilkenny, J.); Kim, Y (Kim, Y.); Kim, YJ (Kim, Y-J); Kimko, J (Kimko, J.); Kimmel, M (Kimmel, M.); Kindel, JM (Kindel, J. M.); King, J (King, J.); Kirkwood, RK (Kirkwood, R. K.); Klaus, L (Klaus, L.); Klem, D (Klem, D.); Kline, JL (Kline, J. L.); Klingmann, J (Klingmann, J.); Kluth, G (Kluth, G.); Knapp, P (Knapp, P.); Knauer, J (Knauer, J.); Knipping, J (Knipping, J.); Knudson, M (Knudson, M.); Kobs, D (Kobs, D.); Koch, J (Koch, J.); Kohut, T (Kohut, T.); Kong, C (Kong, C.); Koning, JM (Koning, J. M.); Koning, P (Koning, P.); Konior, S (Konior, S.); Kornblum, H (Kornblum, H.); Kot, LB (Kot, L. B.); Koziozemski, B (Koziozemski, B.); Kozlowski, M (Kozlowski, M.); Kozlowski, PM (Kozlowski, P. M.); Krammen, J (Krammen, J.); Krasheninnikova, NS (Krasheninnikova, N. S.); Kraus, B (Kraus, B.); Krauser, W (Krauser, W.); Kress, JD (Kress, J. D.); Kritcher, AL (Kritcher, A. L.); Krieger, E (Krieger, E.); Kroll, JJ (Kroll, J. J.); Kruer, WL (Kruer, W. L.); Kruse, MKG (Kruse, M. K. G.); Kucheyev, S (Kucheyev, S.); Kumbera, M (Kumbera, M.); Kumpan, S (Kumpan, S.); Kunimune, J (Kunimune, J.); Kustowski, B (Kustowski, B.); Kwan, TJT (Kwan, T. J. T.); Kyrala, GA (Kyrala, G. A.); Laffite, S (Laffite, S.); Lafon, M (Lafon, M.); LaFortune, K (LaFortune, K.); Lahmann, B (Lahmann, B.); Lairson, B (Lairson, B.); Landen, OL (Landen, O. L.); Langenbrunner, J (Langenbrunner, J.); Lagin, L (Lagin, L.); Land, T (Land, T.); Lane, M (Lane, M.); Laney, D (Laney, D.); Langdon, AB (Langdon, A. B.); Langer, SH (Langer, S. H.); Langro, A (Langro, A.); Lanier, NE (Lanier, N. E.); Lanier, TE (Lanier, T. E.); Larson, D (Larson, D.); Lasinski, BF (Lasinski, B. F.); Lassle, D (Lassle, D.); LaTray, D (LaTray, D.); Lau, G (Lau, G.); Lau, N (Lau, N.); Laumann, C (Laumann, C.); Laurence, A (Laurence, A.); Laurence, TA (Laurence, T. A.); Lawson, J (Lawson, J.); Le, HP (Le, H. P.); Leach, RR (Leach, R. R.); Leal, L (Leal, L.); Leatherland, A (Leatherland, A.); LeChien, K (LeChien, K.); Lechleiter, B (Lechleiter, B.); Lee, A (Lee, A.); Lee, M (Lee, M.); Lee, T (Lee, T.); Leeper, RJ (Leeper, R. J.); Lefebvre, E (Lefebvre, E.); Leidinger, JP (Leidinger, J-P); LeMire, B (LeMire, B.); Lemke, RW (Lemke, R. W.); Lemos, NC (Lemos, N. C.); Le Pape, S (Le Pape, S.); Lerche, R (Lerche, R.); Lerner, S (Lerner, S.); Letts, S (Letts, S.); Levedahl, K (Levedahl, K.); Lewis, T (Lewis, T.); Li, CK (Li, C. K.); Li, H (Li, H.); Li, J (Li, J.); Liao, W (Liao, W.); Liao, ZM (Liao, Z. M.); Liedahl, D (Liedahl, D.); Liebman, J (Liebman, J.); Lindford, G (Lindford, G.); Lindman, EL (Lindman, E. L.); Lindl, JD (Lindl, J. D.); Loey, H (Loey, H.); London, RA (London, R. A.); Long, F (Long, F.); Loomis, EN (Loomis, E. N.); Lopez, FE (Lopez, F. 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Abstract: For more than half a century, researchers around the world have been engaged in attempts to achieve fusion ignition as a proof of principle of various fusion concepts. Following the Lawson criterion, an ignited plasma is one where the fusion heating power is high enough to overcome all the physical processes that cool the fusion plasma, creating a positive thermodynamic feedback loop with rapidly increasing temperature. In inertially confined fusion, ignition is a state where the fusion plasma can begin "burn propagation" into surrounding cold fuel, enabling the possibility of high energy gain. While "scientific breakeven" (i.e., unity target gain) has not yet been achieved (here target gain is 0.72, 1.37 MJ of fusion for 1.92 MJ of laser energy), this Letter reports the first controlled fusion experiment, using laser indirect drive, on the National Ignition Facility to produce capsule gain (here 5.8) and reach ignition by nine different formulations of the Lawson criterion.

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Published: MAY 1 2022
Abstract: The interaction between a molecular cloud and an external agent (e.g., a supernova remnant, plasma jet, radiation, or another cloud) is a common phenomenon throughout the Universe and can significantly change the star formation rate within a galaxy. This process leads to fragmentation of the cloud and to its subsequent compression and can, eventually, initiate the gravitational collapse of a stable molecular cloud. It is, however, difficult to study such systems in detail using conventional techniques (numerical simulations and astronomical observations), since complex interactions of flows occur. In this paper, we experimentally investigate the compression of a foam ball by Taylor-Sedov blast waves, as an analog of supernova remnants interacting with a molecular cloud. The formation of a compression wave is observed in the foam ball, indicating the importance of such experiments for understanding how star formation is triggered by external agents.
Accession Number: WOS:000790478100001

Record 3 of 44

By: Alejo, A (Alejo, A.); Ahmed, H (Ahmed, H.); Krygier, AG (Krygier, A. G.); Clarke, R (Clarke, R.); Freeman, RR (Freeman, R. R.); Fuchs, J (Fuchs, J.); Green, A (Green, A.); Green, JS (Green, J. S.); Jung, D (Jung, D.); Kleinschmidt, A (Kleinschmidt, A.); Morrison, JT (Morrison, J. T.); Najmudin, Z (Najmudin, Z.); Nakamura, H (Nakamura, H.); Norreys, P (Norreys, P.); Notley, M (Notley, M.); Oliver, M (Oliver, M.); Roth, M (Roth, M.); Vassura, L (Vassura, L.); Zepf, M (Zepf, M.); Borghesi, M (Borghesi, M.); Kar, S (Kar, S.)

Title: Stabilized Radiation Pressure Acceleration and Neutron Generation in Ultrathin Deuterated Foils

Source: PHYSICAL REVIEW LETTERS
Volume: 129
Issue: 11
Article Number: 114801
DOI: 10.1103/PhysRevLett.129.114801
Document Type: Article
Published: SEP 9 2022
Abstract: Premature relativistic transparency of ultrathin, laser-irradiated targets is recognized as an obstacle to achieving a stable radiation pressure acceleration in the "light sail" (LS) mode. Experimental data, corroborated by 2D PIC simulations, show that a few-nm thick overcoat surface layer of high Z material significantly improves ion bunching at high energies during the acceleration. This is diagnosed by simultaneous ion and neutron spectroscopy following irradiation of deuterated plastic targets. In particular, copious and directional neutron production (significantly larger than for other in-target schemes) arises, under optimal parameters, as a signature of plasma layer integrity during the acceleration.
Accession Number: WOS:000865935700008
PubMed ID: 36154426

Record 4 of 44

By: Almansa, I (Almansa, I); Russman, F (Russman, F.); Marini, S (Marini, S.); Peter, E (Peter, E.); Rizzato, FB (Rizzato, F. B.)

Title: Radiation Reaction in Spatially Modulated Fields Accelerators

Source: BRAZILIAN JOURNAL OF PHYSICS
Volume: 52
Issue: 4
Article Number: 122
DOI: 10.1007/s13538-022-01122-7
Document Type: Article
Published: AUG 2022

Abstract: It is possible to accelerate efficiently a charged particle toward the speed of light through a spatially modulated electrostatic field and through the superposition of a spatially modulated magnetic field and a laser. In both cases, the acceleration process requires an adequate initial velocity of the particle and depends on the amplitude of the fields, the length scale of the modulation and the wavenumbers, and frequencies of the fields. The physics behind these accelerators involves a resonance between the particle's velocity and the field's phase velocity. The promising results, however, may be affected when the radiation reaction effect is included in the calculations. Understanding the role of the radiation reaction over these schemes is the aim of the present work. As we are going to show, in a counter-intuitive way, the effects of radiation reaction can help to accelerate charge particles under some specific conditions.

Accession Number: WOS:000798174100001

Record 5 of 44

By: Bleotu, PG (Bleotu, P-G); Wheeler, J (Wheeler, J.); Papadopoulos, D (Papadopoulos, D.); Chabanis, M (Chabanis, M.); Prudent, J (Prudent, J.); Frotin, M (Frotin, M.); Martin, L (Martin, L.); Lebas, N (Lebas, N.); Freneaux, A (Freneaux, A.); Beluze, A (Beluze, A.); Mathieu, F (Mathieu, F.); Audebert, P (Audebert, P.); Ursescu, D (Ursescu, D.); Fuchs, J (Fuchs, J.); Mourou, G (Mourou, G.)

Title: Spectral broadening for multi-Joule pulse compression in the APOLLON Long Focal Area facility

Source: HIGH POWER LASER SCIENCE AND ENGINEERING

Volume: 10

Article Number: e9

DOI: 10.1017/hpl.2021.61

Document Type: Article

Published: JAN 10 2022

Abstract: Spectral-broadening of the APOLLON PW-class laser pulses using a thin-film compression technique within the long-focal-area interaction chamber of the APOLLON laser facility is reported, demonstrating the delivery of the full energy pulse to the target interaction area. The laser pulse at 7 J passing through large aperture, thin glass wafers is spectrally broadened to a bandwidth that is compatible with a 15-fs pulse, indicating also the possibility to achieve sub-10-fs pulses using 14 J. Placing the post-compressor near the interaction makes for an economical method to produce the shortest pulses by limiting the need for high damage, broadband optics close to the final target rather than throughout the entire laser transport system.

Accession Number: WOS:000763383400001

Record 6 of 44

By: Bolanos, S (Bolanos, Simon); Sladkov, A (Sladkov, Andrey); Smets, R (Smets, Roch); Chen, SN (Chen, Sophia N.); Grisollet, A (Grisollet, Alain); Filippov, E (Filippov, Evgeny); Henares, JL (Henares, Jose-Luis); Nastasa, V (Nastasa, Viorel); Pikuz, S (Pikuz, Sergey); Riquier, R (Riquier, Raphel); Safronova, M (Safronova, Maria); Severin, A (Severin, Alexandre); Starodubtsev, M (Starodubtsev, Mikhail); Fuchs, J (Fuchs, Julien)

Title: Laboratory evidence of magnetic reconnection hampered in obliquely interacting flux tubes

Source: NATURE COMMUNICATIONS

Volume: 13

Issue: 1

Article Number: 6426

DOI: 10.1038/s41467-022-33813-9

Document Type: Article

Published: OCT 28 2022

Abstract: Magnetic reconnection can occur when two plasmas, having anti-parallel components of the magnetic field, encounter each other. In the reconnection plane, the anti-parallel component of the field is annihilated and its energy released in the plasma. Here, we investigate through laboratory experiments the reconnection between two flux tubes that are not strictly anti-parallel. Compression of the anti-parallel component of the magnetic field is observed, as well as a decrease of the reconnection efficiency. Concomitantly, we observe delayed plasma heating and enhanced particle acceleration. Three-dimensional hybrid simulations support these observations and highlight the plasma heating inhibition and reconnection efficiency reduction for these obliquely oriented flux tubes. Magnetic reconnection acts as energy transfer process in plasma and induces processes like plasma heating, particle

acceleration. Here the authors demonstrate the variation of magnetic reconnection between two flux tubes in the presence of external magnetic field.

Accession Number: WOS:000886265500035

PubMed ID: 36307404

Record 7 of 44

By: Burdonov, K (Burdonov, K.); Yao, W (Yao, W.); Sladkov, A (Sladkov, A.); Bonito, R (Bonito, R.); Chen, SN (Chen, S. N.); Ciardi, A (Ciardi, A.); Korzhimanov, A (Korzhimanov, A.); Soloviev, A (Soloviev, A.); Starodubtsev, M (Starodubtsev, M.); Zemskov, R (Zemskov, R.); Orlando, S (Orlando, S.); Romanova, M (Romanova, M.); Fuchs, J (Fuchs, J.)

Title: Laboratory modelling of equatorial 'tongue' accretion channels in young stellar objects caused by the Rayleigh-Taylor instability

Source: ASTRONOMY & ASTROPHYSICS

Volume: 657

Article Number: A112

DOI: 10.1051/0004-6361/202140997

Document Type: Article

Published: JAN 20 2022

Abstract: Context. The equatorial accretion scenario, caused by the development of the Rayleigh-Taylor (RT) instability at the disk edge, was suggested by accurate three-dimensional magnetohydrodynamic (MHD) modelling, but no observational or experimental confirmation of such phenomena has been evidenced yet. Aims. We studied the propagation of a laterally extended laser-generated plasma stream across a magnetic field and investigated if this kind of structure can be scaled to the case of equatorial 'tongue' accretion channels in young stellar objects (YSOs); if so, this would support the possibility of equatorial accretion in young accreting stars. Methods. We conducted a scaled laboratory experiment at the PEARL laser facility. The experiment consists in an optical laser pulse that is focused onto the surface of a Teflon target. The irradiation of the target leads to the expansion of a hot plasma stream into the vacuum, perpendicularly to an externally applied magnetic field. We used a Mach-Zehnder interferometer to diagnose the plasma stream propagation along two axes, to obtain the three-dimensional distribution of the plasma stream. Results. The laboratory experiment shows the propagation of a laterally extended laser-generated plasma stream across a magnetic field. We demonstrate that: (i) such a stream is subject to the development of the RT instability, and (ii) the stream, decomposed into tongues, is able to efficiently propagate perpendicular to the magnetic field. Based on numerical simulations, we show that the origin of the development of the instability in the laboratory is similar to that observed in MHD models of equatorial tongue accretion in YSOs. Conclusions. As we verify that the laboratory plasma scales favourably to accretion inflows of YSOs, our laboratory results support the argument in favour of the possibility of the RT-instability-caused equatorial tongue accretion scenario in the astrophysical case.

Accession Number: WOS:000744641300009

Record 8 of 44

By: Chaudhary, P (Chaudhary, Pankaj); Gwynne, DC (Gwynne, Deborah C.); Odlozilik, B (Odlozilik, Boris); McMurray, A (McMurray, Aaron); Milluzzo, G (Milluzzo, Giuliana); Maiorino, C (Maiorino, Carla); Doria, D (Doria, Domenico); Ahmed, H (Ahmed, Hamad); Romagnani, L (Romagnani, Lorenzo); Alejo, A (Alejo, Aaron); Padda, H (Padda, Hersimerjit); Green, J (Green, James); Carroll, D (Carroll, David); Booth, N (Booth, Nicola); McKenna, P (McKenna, Paul); Kar, S (Kar, Satyabrata); Petringa, G (Petringa, Giada); Catalano, R (Catalano, Roberto); Cammarata, FP (Cammarata, Francesco P.); Cirrone, GAP (Cirrone, Giuseppe A. P.); McMahon, SJ (McMahon, Stephen J.); Prise, KM (Prise, Kevin M.); Borghesi, M (Borghesi, Marco)

Title: Development of a portable hypoxia chamber for ultra-high dose rate laser-driven proton radiobiology applications

Source: RADIATION ONCOLOGY

Volume: 17

Issue: 1

Article Number: 77

DOI: 10.1186/s13014-022-02024-3

Document Type: Article

Published: APR 15 2022

Abstract: Background There is currently significant interest in assessing the role of oxygen in the radiobiological effects at ultra-high dose rates. Oxygen modulation is postulated to play a role in the enhanced sparing effect observed in FLASH radiotherapy, where particles are delivered at 40-1000 Gy/s. Furthermore, the development of laser-driven accelerators now enables radiobiology experiments in extreme regimes where dose rates can exceed 10(9) Gy/s, and predicted oxygen depletion effects on cellular response can be tested. Access to appropriate experimental enviroments, allowing measurements under controlled oxygenation conditions, is a key requirement for these studies. We report on the development and application of a bespoke portable hypoxia chamber specifically designed for experiments employing laser-driven sources, but also suitable for comparator studies under FLASH and conventional irradiation conditions. Materials and methods We used oxygen concentration measurements to test the induction of hypoxia and the maintenance capacity of the chambers. Cellular hypoxia induction was verified using hypoxia inducible factor-1 alpha immunostaining. Calibrated radiochromic films and GEANT-4 simulations verified the dosimetry variations inside and outside the chambers. We irradiated hypoxic human skin fibroblasts (AG01522B) cells with laser-driven protons, conventional protons and reference 225 kVp X-rays to quantify DNA DSB damage and repair under hypoxia. We further measured the oxygen enhancement ratio for cell survival after X-ray exposure in normal fibroblast and radioresistant patient- derived GBM stem cells. Results Oxygen measurements showed that our chambers maintained a radiobiological hypoxic environment for at least 45 min and pathological hypoxia for up to 24 h after disconnecting the chambers from the gas supply. We observed a significant reduction in the 53BP1 foci induced by laser-driven protons, conventional protons and X-rays in the hypoxic cells compared to normoxic cells at 30 min post-irradiation. Under hypoxic irradiations, the Laser-driven protons induced significant residual DNA DSB damage in hypoxic AG01522B cells compared to the conventional dose rate protons suggesting an important impact of these extremely high dose-rate exposures. We obtained an oxygen enhancement ratio (OER) of 2.1 +/- 0.1 and 2.5 +/- 0.1 respectively for the AG01522B and patient-derived GBM stem cells for X-ray irradiation using our hypoxia chambers. Conclusion We demonstrated the design and application of portable hypoxia chambers for studying cellular radiobiological endpoints after exposure to laser-driven protons at ultra-high dose, conventional protons and X-rays. Suitable levels of reduced oxygen concentration could be maintained in the absence of external gassing to quantify hypoxic effects. The data obtained provided indication of an enhanced residual DNA DSB damage under hypoxic conditions at ultra-high dose rate compared to the conventional protons or X-rays.

Accession Number: WOS:000782762500003

PubMed ID: 35428301

Record 9 of 44

By: Chen, Q (Chen, Qiang); Maslarova, D (Maslarova, Dominika); Wang, JZ (Wang, Junzhi); Lee, SX (Lee, Shao Xian); Horny, V (Horny, Vojtech); Umstadter, D (Umstadter, Donald)

Title: Transient Relativistic Plasma Grating to Tailor High-Power Laser Fields, Wakefield Plasma Waves, and Electron Injection

Source: PHYSICAL REVIEW LETTERS

Volume: 128

Issue: 16

Article Number: 164801

DOI: 10.1103/PhysRevLett.128.164801

Document Type: Article

Published: APR 20 2022

Abstract: We show the first experiment of a transverse laser interference for electron injection into the laser plasma accelerators. Simulations show such an injection is different from previous methods, as electrons are trapped into later acceleration buckets other than the leading ones. With optimal plasma tapering, the dephasing limit of such unprecedented electron beams could be potentially increased by an order of magnitude. In simulations, the interference drives a relativistic plasma grating, which triggers the splitting of relativistic-intensity laser pulses and wakefield. Consequently, spatially dual electron beams are accelerated, as also confirmed by the experiment.

Accession Number: WOS:000804569000006

PubMed ID: 35522507

Record 10 of 44

By: Fazzini, A (Fazzini, A.); Yao, W (Yao, W.); Burdonov, K (Burdonov, K.); Beard, J (Beard, J.); Chen, SN (Chen, S. N.); Ciardi, A (Ciardi, A.); D'Humieres, E (D'Humieres, E.); Diab, R (Diab, R.); Filippov, ED (Filippov, E. D.); Kisyov, S (Kisyov, S.); Lelasseux, V (Lelasseux, V); Miceli, M (Miceli, M.); Moreno, Q (Moreno, Q.); Orlando, S (Orlando, S.); Pikuz, S (Pikuz, S.); Ribeyre, X (Ribeyre, X.); Starodubtsev, M (Starodubtsev, M.); Zemskov, R (Zemskov, R.); Fuchs, J (Fuchs, J.)

Title: Particle energization in colliding subcritical collisionless shocks investigated in the laboratory

Source: ASTRONOMY & ASTROPHYSICS

Volume: 665

Article Number: A87

DOI: 10.1051/0004-6361/202243277

Document Type: Article

Published: SEP 13 2022

Abstract: Context. Colliding collisionless shocks appear across a broad variety of astrophysical phenomena and are thought to be possible sources of particle acceleration in the Universe. Aims. The main goal of our experimental and computational work is to understand the effect of the interpenetration between two subcritical collisionless shocks on particle energization. Methods. To investigate the detailed dynamics of this phenomenon, we performed a dedicated laboratory experiment. We generated two counter-streaming subcritical collisionless magnetized shocks by irradiating two Teflon (C2F4) targets with 100 J, 1 ns laser beams on the LULI2000 laser facility. The interaction region between the plasma flows was pre-filled with a low-density background hydrogen plasma and initialized with an externally applied homogeneous magnetic field perpendicular to the shocks. We also modeled the macroscopic evolution of the system via hydrodynamic simulations and the microphysics at play during the interaction via particle-in-cell (PIC) simulations. Results. Here, we report our measurements of the plasma density and temperature during the formation of the supercritical shocks, their transition to subcritical, and their final interpenetration. We find that in the presence of two shocks, the ambient ions reach energies around 1.5 times of those obtained with single shocks. Both the presence of the downstream zone of the second shock and of the downstream zone common for the two shocks play a role in the different energization: the characteristics of the perpendicular electric fields in the two areas indeed allow for certain particles to continue being accelerated or, at least, to avoid being decelerated. Conclusions. The findings of our laboratory investigation are relevant for our understanding of the energy distribution of high-energy particles that populate the interplanetary space in our solar system and the very local interstellar medium around the heliopause, where observations have indicated evidence of subcritical collisionless shocks that may eventually go on to collide with one another.

Accession Number: WOS:000853194500011

Record 11 of 44

By: Fletcher, LB (Fletcher, L. B.); Vorberger, J (Vorberger, J.); Schumaker, W (Schumaker, W.); Ruyer, C (Ruyer, C.); Goede, S (Goede, S.); Galtier, E (Galtier, E.); Zastrau, U (Zastrau, U.); Alves, EP (Alves, E. P.); Baalrud, SD (Baalrud, S. D.); Baggott, RA (Baggott, R. A.); Barbrel, B (Barbrel, B.); Chen, Z (Chen, Z.); Doppner, T (Doeppner, T.); Gauthier, M (Gauthier, M.); Granados, E (Granados, E.); Kim, JB (Kim, J. B.); Kraus, D (Kraus, D.); Lee, HJ (Lee, H. J.); MacDonald, MJ (MacDonald, M. J.); Mishra, R (Mishra, R.); Pelka, A (Pelka, A.); Ravasio, A (Ravasio, A.); Roedel, C (Roedel, C.); Fry, AR (Fry, A. R.); Redmer, R (Redmer, R.); Fiuza, F (Fiuza, F.); Gericke, DO (Gericke, D. O.); Glenzer, SH (Glenzer, S. H.)

Title: Electron-Ion Temperature Relaxation in Warm Dense Hydrogen Observed With Picosecond Resolved X-Ray Scattering

Source: FRONTIERS IN PHYSICS

Volume: 10

Article Number: 838524

DOI: 10.3389/fphy.2022.838524

Document Type: Article

Published: MAR 24 2022

Abstract: Angularly resolved X-ray scattering measurements from fs-laser heated hydrogen have been used to determine the equilibration of electron and ion temperatures in the warm dense matter regime. The relaxation of rapidly heated cryogenic hydrogen is visualized using 5.5 keV X-ray pulses from the Linac Coherent Light (LCLS) source in a 1 Hz repetition rate pump-probe setting. We demonstrate that the electron-ion energy transfer is faster than quasi-classical Landau-Spitzer models that use ad hoc cutoffs in the Coulomb logarithm.

Accession Number: WOS:000782592100001

Record 12 of 44

By: Gelfer, EG (Gelfer, E. G.); Fedotov, AM (Fedotov, A. M.); Mironov, AA (Mironov, A. A.); Weber, S (Weber, S.)

Title: Nonlinear Compton scattering in time-dependent electric fields beyond the locally constant crossed field approximation

Source: PHYSICAL REVIEW D

Volume: 106

Issue: 5

Article Number: 056013

DOI: 10.1103/PhysRevD.106.056013

Document Type: Article

Published: SEP 19 2022

Abstract: Locally constant crossed field approximation (LCFA) is a powerful tool for theoretical and numerical studies of various strong field quantum electrodynamical effects. We explore this approximation in detail for photon emission by a spinless particle in a strong time-dependent electric field. This kind of electromagnetic fields is of particular interest, because, in contrast to the comprehensively studied case of a plane wave, they are not crossed. We develop an approach for calculating photon emission probability in a generic time-dependent electric field, establish the range of applicability of LCFA, and calculate the corrections to it.

Accession Number: WOS:000861578000001

Record 13 of 44

By: Gleason, AE (Gleason, Arianna E.); Park, S (Park, Sulgiye); Rittman, DR (Rittman, Dylan R.); Ravasio, A (Ravasio, Alessandra); Langenhorst, F (Langenhorst, Falko); Bolis, RM (Bolis, Riccardo M.); Granados, E (Granados, Eduardo); Hok, S (Hok, Sovanndara); Kroll, T (Kroll, Thomas); Sikorski, M (Sikorski, Marcin); Weng, TC (Weng, Tsu-Chien); Lee, HJ (Lee, Hae Ja); Nagler, B (Nagler, Bob); Sisson, T (Sisson, Thomas); Xing, Z (Xing, Zhou); Zhu, DL (Zhu, Diling); Giuli, G (Giuli, Gabriele); Mao, WL (Mao, Wendy L.); Glenzer, SH (Glenzer, Siegfried H.); Sokaras, D (Sokaras, Dimosthenis); Alonso-Mori, R (Alonso-Mori, Roberto)

Title: Ultrafast structural response of shock-compressed plagioclase

Source: METEORITICS & PLANETARY SCIENCE

Volume: 57

Issue: 3

Pages: 635-643

Article Number: 13785

DOI: 10.1111/maps.13785

Early Access Date: FEB 2022

Document Type: Article

Published: MAR 2022

Abstract: Meteor impacts can induce unique pressure-dependent structural changes in minerals due to the propagation of shock waves. Plagioclase-ubiquitous throughout the Earth's crust, extraterrestrial bodies, and meteorites-is commonly used for reconstructing the impact history and conditions of the parent bodies. However, there have been unresolved inconsistencies in the interpretation of shock transformations across previous studies: The pressure at which amorphization begins and the process by which it occurs is the subject of ongoing debate. Here, we utilize time-resolved in situ X-ray diffraction (XRD) to probe the phase transformation pathway of plagioclase during shock compression at a sub-nanosecond timescale. Direct amorphization begins at pressures much lower than what was previously assumed, just above the Hugoniot elastic limit of 5 GPa, with full amorphization to a high-density amorphous phase, observed at 32(10) GPa and 20 ns. Upon release, the material partially recrystallizes back into the original structure, demonstrating a memory effect.

Accession Number: WOS:000755921800001

Record 14 of 44

By: Gristwood, K (Gristwood, Katie); Luli, S (Luli, Saimir); Rankin, KS (Rankin, Kenneth S.); Knight, JC (Knight, James C.)

Title: In situ excitation of BODIPY fluorophores by Zr-89-generated Cerenkov luminescence

Source: CHEMICAL COMMUNICATIONS

Volume: 58

Issue: 83

Pages: 11689-11692

DOI: 10.1039/d2cc03875g

Early Access Date: SEP 2022

Document Type: Article

Published: OCT 18 2022

Abstract: Secondary Cerenkov-induced fluorescence imaging (SCIFI) is an emerging optical imaging technology that affords high signal-to-noise images by utilising radionuclide-generated Cerenkov luminescence to excite fluorescent probes. BODIPY dyes offer attractive properties for SCIFI, including high quantum yields and photochemical stability, yet their utility in this application in combination with clinically relevant beta(+)-emitting radioisotopes remains largely unexplored. In this report, the fluorescence properties of three meso-substituted BODIPY analogues have been assessed in combination with the positron emitter zirconium-89. Most notably, SCIFI data acquired over 7 days shows the BODIPY scaffold remain largely inert to radiolysis, indicating the promising utility of this fluorophore class in SCIFI applications.

Accession Number: WOS:000861538800001

PubMed ID: 36173358

Record 15 of 44

By: He, Zhiyu; Rodel, Melanie; Lutgert, Julian; Bergermann, Armin; Bethkenhagen, Mandy; Chekrygina, Deniza; Cowan, Thomas E; Descamps, Adrien; French, Martin; Galtier, Eric; Gleason, Arianna E; Glenn, Griffin D; Glenzer, Siegfried H; Inubushi, Yuichi; Hartley, Nicholas J; Hernandez, Jean-Alexis; Heuser, Benjamin; Humphries, Oliver S; Kamimura, Nobuki; Katagiri, Kento; Khaghani, Dimitri; Lee, Hae Ja; McBride, Emma E; Miyanishi, Kohei; Nagler, Bob; Ofori-Okai, Benjamin; Ozaki, Norimasa; Pandolfi, Silvia; Qu, Chongbing; Ranjan, Divyanshu; Redmer, Ronald; Schoenwaelder, Christopher; Schuster, Anja K; Stevenson, Michael G; Sueda, Keiichi; Togashi, Tadashi; Vinci, Tommaso; Voigt, Katja; Vorberger, Jan; Yabashi, Makina; Yabuuchi, Toshinori; Zinta, Lisa M V; Ravasio, Alessandra; Kraus, Dominik

Title: Diamond formation kinetics in shock-compressed C─H─O samples recorded by small-angle x-ray scattering and x-ray diffraction.

Source: Science advances

Volume: 8

Issue: 35

Pages: eabo0617

DOI: 10.1126/sciadv.abo0617

Document Type: Journal Article

Published: 2022-Sep-02

Abstract: Extreme conditions inside ice giants such as Uranus and Neptune can result in peculiar chemistry and structural transitions, e.g., the precipitation of diamonds or superionic water, as so far experimentally observed only for pure C─H and H2O systems, respectively. Here, we investigate a stoichiometric mixture of C and H2O by shock-compressing polyethylene terephthalate (PET) plastics and performing in situ x-ray probing. We observe diamond formation at pressures between 72 ± 7 and 125 ± 13 GPa at temperatures ranging from ~3500 to ~6000 K. Combining x-ray diffraction and small-angle x-ray scattering, we access the kinetics of this exotic reaction. The observed demixing of C and H2O suggests that diamond precipitation inside the ice giants is enhanced by oxygen, which can lead to isolated water and thus the formation of superionic structures relevant to the planets' magnetic fields. Moreover, our measurements indicate a way of producing nanodiamonds by simple laser-driven shock compression of cheap PET plastics.

Accession Number: MEDLINE:36054354

PubMed ID: 36054354

Record 16 of 44

By: Horny, V (Horny, Vojtech); Chen, SN (Chen, Sophia N.); Davoine, X (Davoine, Xavier); Lelasseux, V (Lelasseux, Vincent); Gremillet, L (Gremillet, Laurent); Fuchs, J (Fuchs, Julien)

Title: High-flux neutron generation by laser-accelerated ions from single- and double-layer targets

Source: SCIENTIFIC REPORTS

Volume: 12

Issue: 1

Article Number: 19767

DOI: 10.1038/s41598-022-24155-z

Document Type: Article

Published: NOV 17 2022

Abstract: Contemporary ultraintense, short-pulse laser systems provide extremely compact setups for the production of high-flux neutron beams, such as those required for nondestructive probing of dense matter, research on neutron-induced damage in fusion devices or laboratory astrophysics studies. Here, by coupling particle-in-cell and Monte Carlo numerical simulations, we examine possible strategies to optimise neutron sources from ion-induced nuclear reactions using 1-PW, 20-fs-class laser systems. To improve the ion acceleration, the laser-irradiated targets are chosen to be ultrathin solid foils, either standing alone or preceded by a plasma layer of near-critical density to enhance the laser focusing. We compare the performance of these single- and double-layer targets, and determine their optimum parameters in terms of energy and angular spectra of the accelerated ions. These are then sent into a converter to generate neutrons via nuclear reactions on beryllium and lead nuclei. Overall, we identify configurations that result in neutron yields as high as similar to 10(10) n sr(-1) in similar to 1-cm-thick converters or instantaneous neutron fluxes above 10(23) n cm(-2) s(-1) at the backside of less than or similar to 100-mu m- thick converters. Considering a realistic repetition rate of one laser shot per minute, the corresponding time-averaged neutron yields are predicted to reach values (greater than or similar to 10(7) n sr(-1) s(-1)) well above the current experimental record, and this even with a mere thin foil as a primary target. A further increase in the time-averaged yield up to above 10(8) sr(-1) s(-1) is foreseen using double-layer targets.

Accession Number: WOS:000885172100080

PubMed ID: 36396701

Record 17 of 44

By: Kritcher, AL (Kritcher, A. L.); Zylstra, AB (Zylstra, A. B.); Callahan, DA (Callahan, D. A.); Hurricane, OA (Hurricane, O. A.); Weber, CR (Weber, C. R.); Clark, DS (Clark, D. S.); Young, CV (V. Young, C.); Ralph, JE (Ralph, J. E.); Casey, DT (Casey, D. T.); Pak, A (Pak, A.); Landen, OL (Landen, O. L.); Bachmann, B (Bachmann, B.); Baker, KL (Baker, K. L.); Hopkins, LB (Hopkins, L. Berzak); Bhandarkar, SD (Bhandarkar, S. D.); Biener, J (Biener, J.); Bionta, RM (Bionta, R. M.); Birge, NW (Birge, N. W.); Braun, T (Braun, T.); Briggs, TM (Briggs, T. M.); Celliers, PM (Celliers, P. M.); Chen, H (Chen, H.); Choate, C (Choate, C.); Divol, L (Divol, L.); Doeppner, T (Doeppner, T.); Fittinghoff, D (Fittinghoff, D.); Edwards, MJ (Edwards, M. J.); Johnson, MG (Johnson, M. Gatu); Gharibyan, N (Gharibyan, N.); Haan, S (Haan, S.); Hahn, KD (Hahn, K. D.); Hartouni, E (Hartouni, E.); Hinkel, DE (Hinkel, D. E.); Ho, DD (Ho, D. D.); Hohenberger, M (Hohenberger, M.); Holder, JP (Holder, J. P.); Huang, H (Huang, H.); Izumi, N (Izumi, N.); Jeet, J (Jeet, J.); Jones, O (Jones, O.); Kerr, SM (Kerr, S. M.); Khan, SF (Khan, S. F.); Kleinrath, HG (Kleinrath, H. Geppert); Kleinrath, VG (Kleinrath, V. Geppert); Kong, C (Kong, C.); Lamb, KM (Lamb, K. M.); Le Pape, S (Le Pape, S.); Lemos, NC (Lemos, N. C.); Lindl, JD (Lindl, J. D.); MacGowan, BJ (MacGowan, B. J.); Mackinnon, AJ (Mackinnon, A. J.); MacPhee, AG (MacPhee, A. G.); Marley, EV (V. Marley, E.); Meaney, K (Meaney, K.); Millot, M (Millot, M.); Moore, AS (Moore, A. S.); Newman, K (Newman, K.); Nicola, JMGD (Nicola, J. -M. G. Di); Nikroo, A (Nikroo, A.); Nora, R (Nora, R.); Patel, PK (Patel, P. K.); Rice, NG (Rice, N. G.); Rubery, MS (Rubery, M. S.); Sater, J (Sater, J.); Schlossberg, DJ (Schlossberg, D. J.); Sepke, SM (Sepke, S. M.); Sequoia, K (Sequoia, K.); Shin, SJ (Shin, S. J.); Stadermann, M (Stadermann, M.); Stoupin, S (Stoupin, S.); Strozzi, DJ (Strozzi, D. J.); Thomas, CA (Thomas, C. A.); Tommasini, R (Tommasini, R.); Trosseille, C (Trosseille, C.); Tubman, ER (Tubman, E. R.); Volegov, PL (Volegov, P. L.); Wild, C (Wild, C.); Woods, DT (Woods, D. T.); Yang, ST (Yang, S. T.)

Title: Design of an inertial fusion experiment exceeding the Lawson criterion for ignition

Source: PHYSICAL REVIEW E

Volume: 106

Issue: 2

Article Number: 025201

DOI: 10.1103/PhysRevE.106.025201

Document Type: Article

Published: AUG 8 2022

Abstract: We present the design of the first igniting fusion plasma in the laboratory by Lawson's criterion that produced 1.37 MJ of fusion energy, Hybrid-E experiment N210808 (August 8, 2021) [Phys. Rev. Lett. 129, 075001 (2022)]. This design uses the indirect drive inertial confinement fusion approach to heat and compress a central "hot spot" of deuterium-tritium (DT) fuel using a surrounding dense DT fuel piston. Ignition occurs when the heating from absorption of alpha particles created in the fusion process overcomes the loss mechanisms in the system for a duration of time. This letter describes key design changes which enabled a similar to 3-6x increase in an ignition figure of merit (generalized Lawson criterion) [Phys. Plasmas 28, 022704 (2021), Phys. Plasmas 25, 122704 (2018)]) and an eightfold increase in fusion energy output compared to predecessor experiments. We present simulations of the hot-spot conditions for experiment N210808 that show fundamentally different behavior compared to predecessor experiments and simulated metrics that are consistent with N210808 reaching for the first time in the laboratory "ignition."

Accession Number: WOS:000886555000004

PubMed ID: 36110025

Record 18 of 44

By: Kritcher, AL (Kritcher, A. L.); Young, CV (Young, C., V); Robey, HF (Robey, H. F.); Weber, CR (Weber, C. R.); Zylstra, AB (Zylstra, A. B.); Hurricane, OA (Hurricane, O. A.); Callahan, DA (Callahan, D. A.); Ralph, JE (Ralph, J. E.); Ross, JS (Ross, J. S.); Baker, KL (Baker, K. L.); Casey, DT (Casey, D. T.); Clark, DS (Clark, D. S.); Doppner, T (Doppner, T.); Divol, L (Divol, L.); Hohenberger, M (Hohenberger, M.); Hopkins, LB (Hopkins, L. Berzak); Le Pape, S (Le Pape, S.); Meezan, NB (Meezan, N. B.); Pak, A (Pak, A.); Patel, PK (Patel, P. K.); Tommasini, R (Tommasini, R.); Ali, SJ (Ali, S. J.); Amendt, PA (Amendt, P. A.); Atherton, LJ (Atherton, L. J.); Bachmann, B (Bachmann, B.); Bailey, D (Bailey, D.); Benedetti, LR (Benedetti, L. R.); Betti, R (Betti, R.); Bhandarkar, SD (Bhandarkar, S. D.); Biener, J (Biener, J.); Bionta, RM (Bionta, R. M.); Birge, NW (Birge, N. W.); Bond, EJ (Bond, E. J.); Bradley, DK (Bradley, D. K.); Braun, T (Braun, T.); Briggs, TM (Briggs, T. M.); Bruhn, MW (Bruhn, M. W.); Celliers, PM (Celliers, P. M.); Chang, B (Chang, B.); Chapman, T (Chapman, T.); Chen, H (Chen, H.); Choate, C (Choate, C.); Christopherson, AR (Christopherson, A. R.); Crippen, JW (Crippen, J. W.); Dewald, EL (Dewald, E. L.); Dittrich, TR (Dittrich, T. R.); Edwards, MJ (Edwards, M. J.); Farmer, WA (Farmer, W. A.); Field, JE (Field, J. E.); Fittinghoff, D (Fittinghoff, D.); Frenje, JA (Frenje, J. A.); Gaffney, JA (Gaffney, J. A.); Johnson, MG (Johnson, M. Gatu); Glenzer, SH (Glenzer, S. H.); Grim, GP (Grim, G. P.); Haan, S (Haan, S.); Hahn, KD (Hahn, K. D.); Hall, GN (Hall, G. N.); Hammel, BA (Hammel, B. A.); Harte, J (Harte, J.); Hartouni, E (Hartouni, E.); Heebner, JE (Heebner, J. E.); Hernandez, VJ (Hernandez, V. J.); Herrmann, H (Herrmann, H.); Herrmann, MC (Herrmann, M. C.); Hinkel, DE (Hinkel, D. E.); Ho, DD (Ho, D. D.); Holder, JP (Holder, J. P.); Hsing, WW (Hsing, W. W.); Huang, H (Huang, H.); Humbird, KD (Humbird, K. D.); Izumi, N (Izumi, N.); Jarrott, LC (Jarrott, L. C.); Jeet, J (Jeet, J.); Jones, O (Jones, O.); Kerbel, GD (Kerbel, G. D.); Kerr, SM (Kerr, S. M.); Khan, SF (Khan, S. F.); Kilkenny, J (Kilkenny, J.); Kim, Y (Kim, Y.); Geppert-Kleinrath, H (Geppert-Kleinrath, H.); Geppert-Kleinrath, V (Geppert-Kleinrath, V); Kong, C (Kong, C.); Koning, JM (Koning, J. M.); Kruse, MKG (Kruse, M. K. G.); Kroll, JJ (Kroll, J. J.); Kustowski, B (Kustowski, B.); Landen, OL (Landen, O. L.); Langer, S (Langer, S.); Larson, D (Larson, D.); Lemos, NC (Lemos, N. C.); Lindl, JD (Lindl, J. D.); Ma, T (Ma, T.); MacDonald, MJ (MacDonald, M. J.); MacGowan, BJ (MacGowan, B. J.); Mackinnon, AJ (Mackinnon, A. J.); MacLaren, SA (MacLaren, S. A.); MacPhee, AG (MacPhee, A. G.); Marinak, MM (Marinak, M. M.); Mariscal, DA (Mariscal, D. A.); Marley, EV (Marley, E., V); Masse, L (Masse, L.); Meaney, K (Meaney, K.); Michel, PA (Michel, P. A.); Millot, M (Millot, M.); Milovich, JL (Milovich, J. L.); Moody, JD (Moody, J. D.); Moore, AS (Moore, A. S.); Morton, JW (Morton, J. W.); Murphy, T (Murphy, T.); Newman, K (Newman, K.); Di Nicola, JMG (Di Nicola, J-M G.); Nikroo, A (Nikroo, A.); Nora, R (Nora, R.); Patel, MV (Patel, M., V); Pelz, LJ (Pelz, L. J.); Peterson, JL (Peterson, J. L.); Ping, Y (Ping, Y.); Pollock, BB (Pollock, B. B.); Ratledge, M (Ratledge, M.); Rice, NG (Rice, N. G.); Rinderknecht, H (Rinderknecht, H.); Rosen, M (Rosen, M.); Rubery, MS (Rubery, M. S.); Salmonson, JD (Salmonson, J. D.); Sater, J (Sater, J.); Schiaffino, S (Schiaffino, S.); Schlossberg, DJ (Schlossberg, D. J.); Schneider, MB (Schneider, M. B.); Schroeder, CR (Schroeder, C. R.); Scott, HA (Scott, H. A.); Sepke, SM (Sepke, S. M.); Sequoia, K (Sequoia, K.); Sherlock, MW (Sherlock, M. W.); Shin, S (Shin, S.); Smalyuk, VA (Smalyuk, V. A.); Spears, BK (Spears, B. K.); Springer, PT (Springer, P. T.); Stadermann, M (Stadermann, M.); Stoupin, S (Stoupin, S.); Strozzi, DJ (Strozzi, D. J.); Suter, LJ (Suter, L. J.); Thomas, CA (Thomas, C. A.); Town, RPJ (Town, R. P. J.); Trosseille, C (Trosseille, C.); Tubman, ER (Tubman, E. R.); Volegov, PL (Volegov, P. L.); Widmann, K (Widmann, K.); Wild, C (Wild, C.); Wilde, CH (Wilde, C. H.); Van Wonterghem, BM (Van Wonterghem, B. M.); Woods, DT (Woods, D. T.); Woodworth, BN (Woodworth,

B. N.); Yamaguchi, M (Yamaguchi, M.); Yang, ST (Yang, S. T.); Zimmerman, GB (Zimmerman, G. B.)

Title: Design of inertial fusion implosions reaching the burning plasma regime

Source: NATURE PHYSICS

Volume: 18

Issue: 3

Pages: 251-+

DOI: 10.1038/s41567-021-01485-9

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Document Type: Article

Published: MAR 2022

Abstract: In a burning plasma state(1-7), alpha particles from deuterium-tritium fusion reactions redeposit their energy and are the dominant source of heating. This state has recently been achieved at the US National Ignition Facility(0) using indirect-drive inertial-confinement fusion. Our experiments use a laser-generated radiation-filled cavity (a hohlraum) to spherically implode capsules containing deuterium and tritium fuel in a central hot spot where the fusion reactions occur. We have developed more efficient hohlraums to implode larger fusion targets compared with previous experiments(9,10). This delivered more energy to the hot spot, whereas other parameters were optimized to maintain the high pressures required for inertial-confinement fusion. We also report improvements in implosion symmetry control by moving energy between the laser beams(11-16) and designing advanced hohlraum geometry(17) that allows for these larger implosions to be driven at the present laser energy and power capability of the National Ignition Facility. These design changes resulted in fusion powers of 1.5 petawatts, greater than the input power of the laser, and 170 kJ of fusion energy(18,19). Radiation hydrodynamics simulations(20,21) show energy deposition by alpha particles as the dominant term in the hot-spot energy balance, indicative of a burning plasma state.

Accession Number: WOS:000747643100001

Record 19 of 44

By: Krygier, A (Krygier, A.); Harmand, M (Harmand, M.); Albertazzi, B (Albertazzi, B.); McBride, EE (McBride, E. E.); Miyanishi, K (Miyanishi, K.); Antonangeli, D (Antonangeli, D.); Inubushi, Y (Inubushi, Y.); Kodama, R (Kodama, R.); Keoning, M (Keoning, M.); Mogni, G (Mogni, G.); Matsuoka, T (Matsuoka, T.); Pietrucci, F (Pietrucci, F.); Saitta, AM (Saitta, A. M.); Togashi, T (Togashi, T.); Umeda, Y (Umeda, Y.); Vinci, T (Vinci, T.); Yabashi, M (Yabashi, M.); Yabuuchi, T (Yabuuchi, T.); Fiquet, G (Fiquet, G.); Ozaki, N (Ozaki, N.)

Title: X-ray diffraction study of phase transformation dynamics of Fe and Fe-Si alloys along the shock Hugoniot using an x-ray free electron laser

Source: PHYSICAL REVIEW B

Volume: 105

Issue: 22

Article Number: L220102

DOI: 10.1103/PhysRevB.105.L220102

Document Type: Article

Published: JUN 7 2022

Abstract: The x-ray free electron laser (XFEL) enables probing a highly compressed material response at the subnanosecond timescale. We exploit the ultrafast XFEL pulse to combine reflection x-ray diffraction and laser-driven shock compression to perform a study of the phase transformation and stability in Fe and Fe-Si alloys. Our approach enables us to observe that solid-solid phase transformations occur in Fe and Fe-Si-8.5 wt % in <= 130 ps at similar to 130 GPa; no transformation is observed in Fe-Si-16 wt % up to 110 GPa. Density functional theory calculations predict similar phase relations.

Accession Number: WOS:000823046700003

Record 20 of 44

By: Kuramitsu, Y (Kuramitsu, Y.); Minami, T (Minami, T.); Hihara, T (Hihara, T.); Sakai, K (Sakai, K.); Nishimoto, T (Nishimoto, T.); Isayama, S (Isayama, S.); Liao, YT (Liao, Y. T.); Wu, KT (Wu, K. T.); Woon, WY (Woon, W. Y.); Chen, SH (Chen, S. H.); Liu, YL (Liu, Y. L.); He, SM (He, S. M.); Su, CY (Su, C. Y.); Ota, M (Ota, M.); Egashira, S (Egashira, S.); Morace, A (Morace, A.); Sakawa, Y (Sakawa, Y.); Abe, Y (Abe, Y.); Habara, H (Habara, H.);

Kodama, R (Kodama, R.); Dohl, LNK (Dohl, L. N. K.); Woolsey, N (Woolsey, N.); Koenig, M (Koenig, M.); Kumar, HS (Kumar, H. S.); Ohnishi, N (Ohnishi, N.); Kanasaki, M (Kanasaki, M.); Asai, T (Asai, T.); Yamauchi, T (Yamauchi, T.); Oda, K (Oda, K.); Kondo, K (Kondo, Ko); Kiriyama, H (Kiriyama, H.); Fukuda, Y (Fukuda, Y.)

Title: Robustness of large-area suspended graphene under interaction with intense laser

Source: SCIENTIFIC REPORTS

Volume: 12

Issue: 1

Article Number: 2346

DOI: 10.1038/s41598-022-06055-4

Document Type: Article

Published: FEB 16 2022

Abstract: Graphene is known as an atomically thin, transparent, highly electrically and thermally conductive, light-weight, and the strongest 2D material. We investigate disruptive application of graphene as a target of laser-driven ion acceleration. We develop large-area suspended graphene (LSG) and by transferring graphene layer by layer we control the thickness with precision down to a single atomic layer. Direct irradiations of the LSG targets generate MeV protons and carbons from sub-relativistic to relativistic laser intensities from low contrast to high contrast conditions without plasma mirror, evidently showing the durability of graphene.

Accession Number: WOS:000757107700021

PubMed ID: 35173182

Record 21 of 44

By: Long, JL (Long, Jia-Li); Lu, L (Lu, Li)

Title: Dynamic coding in the hippocampus during navigation

Source: ZOOLOGICAL RESEARCH

Volume: 43

Issue: 6

Pages: 1023-1025

DOI: 10.24272/j.issn.2095-8137.2022.427

Document Type: Editorial Material

Published: NOV 18 2022

Accession Number: WOS:000892870200016

PubMed ID: 36317467

Record 22 of 44

By: Marret, A (Marret, A.); Ciardi, A (Ciardi, A.); Smets, R (Smets, R.); Fuchs, J (Fuchs, J.); Nicolas, L (Nicolas, L.)

Title: Enhancement of the Nonresonant Streaming Instability by Particle Collisions

Source: PHYSICAL REVIEW LETTERS

Volume: 128

Issue: 11

Article Number: 115101

DOI: 10.1103/PhysRevLett.128.115101

Document Type: Article

Published: MAR 18 2022

Abstract: Streaming cosmic rays can power the exponential growth of a seed magnetic field by exciting a nonresonant instability that feeds on their bulk kinetic energy. By generating the necessary turbulent magnetic field, it is thought to play a key role in the confinement and acceleration of cosmic rays at shocks. In this Letter we present hybrid-particle-in-cell simulations of the nonresonant mode including Monte Carlo collisions, and investigate the interplay between the pressure anisotropies produced by the instability and particle collisions in the background plasma. Simulations of poorly ionized plasmas confirm the rapid damping of the instability by proton-neutral collisions predicted by linear fluid theory calculations. In contrast we find that Coulomb collisions in fully ionized plasmas do not oppose the growth of the magnetic field, but under certain conditions suppress the pressure anisotropies and actually enhance the magnetic field amplification.

Accession Number: WOS:000782905600004

PubMed ID: 35363004

Record 23 of 44

By: Martin, P (Martin, P.); Ahmed, H (Ahmed, H.); Doria, D (Doria, D.); Alejo, A (Alejo, A.); Clarke, R (Clarke, R.); Ferguson, S (Ferguson, S.); Fernandez-Tobias, J (Fernandez-Tobias, J.); Freeman, RR (Freeman, R. R.); Fuchs, J (Fuchs, J.); Green, A (Green, A.); Green, JS (Green, J. S.); Gwynne, D (Gwynne, D.); Hanton, F (Hanton, F.); Jarrett, J (Jarrett, J.); Jung, D (Jung, D.); Kakolee, KF (Kakolee, K. F.); Krygier, AG (Krygier, A. G.); Lewis, CLS (Lewis, C. L. S.); McIlvenny, A (McIlvenny, A.); McKenna, P (McKenna, P.); Morrison, JT (Morrison, J. T.); Najmudin, Z (Najmudin, Z.); Naughton, K (Naughton, K.); Nersisyan, G (Nersisyan, G.); Norreys, P (Norreys, P.); Notley, M (Notley, M.); Roth, M (Roth, M.); Ruiz, JA (Ruiz, J. A.); Scullion, C (Scullion, C.); Zepf, M (Zepf, M.); Zhai, S (Zhai, S.); Borghesi, M (Borghesi, M.); Kar, S (Kar, S.)

Title: Absolute calibration of Fujifilm BAS-TR image plate response to laser driven protons up to 40 MeV

Source: REVIEW OF SCIENTIFIC INSTRUMENTS

Volume: 93

Issue: 5

Article Number: 053303

DOI: 10.1063/5.0089402

Document Type: Article

Published: MAY 1 2022

Abstract: Image plates (IPs) are a popular detector in the field of laser driven ion acceleration, owing to their high dynamic range and reusability. An absolute calibration of these detectors to laser-driven protons in the routinely produced tens of MeV energy range is, therefore, essential. In this paper, the response of Fujifilm BAS-TR IPs to 1-40 MeV protons is calibrated by employing the detectors in high resolution Thomson parabola spectrometers in conjunction with a CR-39 nuclear track detector to determine absolute proton numbers. While CR-39 was placed in front of the image plate for lower energy protons, it was placed behind the image plate for energies above 10 MeV using suitable metal filters sandwiched between the image plate and CR-39 to select specific energies. The measured response agrees well with previously reported calibrations as well as standard models of IP response, providing, for the first time, an absolute calibration over a large range of proton energies of relevance to current experiments. Published under an exclusive license by AIP Publishing.

Accession Number: WOS:000802872400002

PubMed ID: 35649771

Record 24 of 44

By: Martinez, B (Martinez, B.); Chen, SN (Chen, S. N.); Bolanos, S (Bolanos, S.); Blanchot, N (Blanchot, N.); Boutoux, G (Boutoux, G.); Cayzac, W (Cayzac, W.); Courtois, C (Courtois, C.); Davoine, X (Davoine, X.); Duval, A (Duval, A.); Horny, V (Horny, V.); Lantuejoul, I (Lantuejoul, I.); Le Deroff, L (Le Deroff, L.); Masson-Laborde, PE (Masson-Laborde, P. E.); Sary, G (Sary, G.); Vauzour, B (Vauzour, B.); Smets, R (Smets, R.); Gremillet, L (Gremillet, L.); Fuchs, J (Fuchs, J.)

Title: Numerical investigation of spallation neutrons generated from petawatt-scale laser-driven proton beams

Source: MATTER AND RADIATION AT EXTREMES

Volume: 7

Issue: 2

Article Number: 024401

DOI: 10.1063/5.0060582

Document Type: Article

Published: MAR 1 2022

Abstract: Laser-driven neutron sources could offer a promising alternative to those based on conventional accelerator technologies in delivering compact beams of high brightness and short duration. We examine this through particle-in-cell and Monte Carlo simulations that model, respectively, the laser acceleration of protons from thin-foil targets and their subsequent conversion into neutrons in secondary lead targets. Laser parameters relevant to the 0.5

PW LMJ-PETAL and 0.6-6 PW Apollon systems are considered. Owing to its high intensity, the 20-fs-duration 0.6 PW Apollon laser is expected to accelerate protons up to above 100 MeV, thereby unlocking efficient neutron generation via spallation reactions. As a result, despite a 30-fold lower pulse energy than the LMJ-PETAL laser, the 0.6 PW Apollon laser should perform comparably well both in terms of neutron yield and flux. Notably, we predict that very compact neutron pulses, of similar to 10 ps duration and similar to 100 mu m spot size, can be released provided the lead convertor target is thin enough (similar to 100 mu m). These sources are characterized by extreme fluxes, of the order of 10(23) n cm(-2) s(-1), and even ten times higher when using the 6 PW Apollon laser. Such values surpass those currently achievable at large-scale accelerator-based neutron sources (similar to 10(16) n cm(-2) s(-1)), or reported from previous laser experiments using low-Z converters (similar to 10(18) n cm(-2) s(-1)). By showing that such laser systems can produce neutron pulses significantly brighter than existing sources, our findings open a path toward attractive novel applications, such as flash neutron radiography and laboratory studies of heavy-ion nucleosynthesis.

Accession Number: WOS:000738921200002

Record 25 of 44

By: Meinecke, J (Meinecke, Jena); Tzeferacos, P (Tzeferacos, Petros); Ross, JS (Ross, James S.); Bott, AFA (Bott, Archie F. A.); Feister, S (Feister, Scott); Park, HS (Park, Hye-Sook); Bell, AR (Bell, Anthony R.); Blandford, R (Blandford, Roger); Berger, RL (Berger, Richard L.); Bingham, R (Bingham, Robert); Casner, A (Casner, Alexis); Chen, LE (Chen, Laura E.); Foster, J (Foster, John); Froula, DH (Froula, Dustin H.); Goyon, C (Goyon, Clement); Kalantar, D (Kalantar, Daniel); Koenig, M (Koenig, Michel); Lahmann, B (Lahmann, Brandon); Li, CK (Li, Chikang); Lu, YC (Lu, Yingchao); Palmer, CAJ (Palmer, Charlotte A. J.); Petrasso, RD (Petrasso, Richard D.); Poole, H (Poole, Hannah); Remington, B (Remington, Bruce); Reville, B (Reville, Brian); Reyes, A (Reyes, Adam); Rigby, A (Rigby, Alexandra); Ryu, D (Ryu, Dongsu); Swadling, G (Swadling, George); Zylstra, A (Zylstra, Alex); Miniati, F (Miniati, Francesco); Sarkar, S (Sarkar, Subir); Schekochihin, AA (Schekochihin, Alexander A.); Lamb, DQ (Lamb, Donald Q.); Gregori, G (Gregori, Gianluca)

Title: Strong suppression of heat conduction in a laboratory replica of galaxy-cluster turbulent plasmas

Source: SCIENCE ADVANCES

Volume: 8

Issue: 10

Article Number: eabj6799

DOI: 10.1126/sciadv.abj6799

Document Type: Article

Published: MAR 2022

Abstract: In conventional gases and plasmas, it is known that heat fluxes are proportional to temperature gradients, with collisions between particles mediating energy flow from hotter to colder regions and the coefficient of thermal conduction given by Spitzer's theory. However, this theory breaks down in magnetized, turbulent, weakly collisional plasmas, although modifications are difficult to predict from first principles due to the complex, multiscale nature of the problem. Understanding heat transport is important in astrophysical plasmas such as those in galaxy clusters, where observed temperature profiles are explicable only in the presence of a strong suppression of heat conduction compared to Spitzer's theory. To address this problem, we have created a replica of such a system in a laser laboratory experiment. Our data show a reduction of heat transport by two orders of magnitude or more, leading to large temperature variations on small spatial scales (as is seen in cluster plasmas).

Accession Number: WOS:000766438000012

PubMed ID: 35263132

Record 26 of 44

By: Mu, XW (Mu, Xiaowei); Liu, X (Liu, Xin); Ye, XW (Ye, Xiwen); Zhang, W (Zhang, Wei); Li, L (Li, Lu); Ma, PY (Ma, Pinyi); Song, DQ (Song, Daqian)

Title: Branched poly(ethylenimine) carbon dots-MnO_2 nanosheets based fluorescent sensory system for sensing of malachite green in fish samples

Source: FOOD CHEMISTRY

Volume: 394

Article Number: 133517

DOI: 10.1016/j.foodchem.2022.133517

Document Type: Article

Published: NOV 15 2022

Abstract: Malachite green (MG) is an organic dye compound that is frequently used as a fungicide and antiseptic in aquaculture. However, human or animal exposure to MG causes carcinogenic, teratogenic and mutagenic effects. Herein, a novel fluorescent assay was designed for the detection of MG using manganese dioxide nanosheets (MnO2 NS) as an energy acceptor to quench the fluorescence of branched poly(ethylenimine) carbon dots (BPEICDs) via Forster resonance energy transfer. When butyrylcholinesterase is introduced to form thiocholine in the presence of S-butyrylthiocholine iodide, MnO2 NS can be recovered by thiocholine to Mn2+, resulting in restoration of the fluorescence of BPEI-CDs. Exploiting these changes in fluorescence intensity in the above system, a fluorescence probe was successfully developed for the quantitative detection of MG. Besides, this assay was applied to fish samples, verifying the high potential for practical application of the proposed sensor for the monitoring of MG in aquatic products.

Accession Number: WOS:000823810700001

PubMed ID: 35749877

Record 27 of 44

By: Oks, E (Oks, Eugene); Angelo, P (Angelo, Paulo); Dalimier, E (Dalimier, Elisabeth)

Title: Method for Measuring the Pseudomomentum of Hydrogen Atoms by the Number of Observable Hydrogen Lines Controlled by the Diamagnetism

Source: ATOMS

Volume: 10

Issue: 3

Article Number: 95

DOI: 10.3390/atoms10030095

Document Type: Article

Published: SEP 2022

Abstract: Hydrogen atoms, being subjected to a strong magnetic field, exhibit an additional, delocalized potential well at almost a microscopic distance from the nucleus. We studied the influence of the delocalized states of hydrogen atoms on the number of observable hydrogen lines in strongly magnetized plasmas. We show that, for sufficiently large values of the pseudomomentum K (K being the integral of the motion controlling the separation of the center of mass and the relative motions), this effect dominates other factors potentially influencing the number of observable hydrogen lines in strongly magnetized plasmas. We provide examples for plasma parameters relevant to edge plasmas of contemporary and future tokamaks, as well as for DA white dwarfs. We demonstrate that our results open up an avenue for the experimental determination of the pseudomomentum K. This is the first proposed method for the experimental determination of the pseudomomentum-to the best of our knowledge.

Accession Number: WOS:000856231800001

Record 28 of 44

By: Perez-Callejo, G (Perez-Callejo, G.); Vlachos, C (Vlachos, C.); Walsh, CA (Walsh, C. A.); Florido, R (Florido, R.); Bailly-Grandvaux, M (Bailly-Grandvaux, M.); Vaisseau, X (Vaisseau, X.); Suzuki-Vidal, F (Suzuki-Vidal, F.); McGuffey, C (McGuffey, C.); Beg, FN (Beg, F. N.); Bradford, P (Bradford, P.); Ospina-Bohorquez, V (Ospina-Bohorquez, V); Batani, D (Batani, D.); Raffestin, D (Raffestin, D.); Colaitis, A (Colaitis, A.); Tikhonchuk, V (Tikhonchuk, V); Casner, A (Casner, A.); Koenig, M (Koenig, M.); Albertazzi, B (Albertazzi, B.); Fedosejevs, R (Fedosejevs, R.); Woolsey, N (Woolsey, N.); Ehret, M (Ehret, M.); Debayle, A (Debayle, A.); Loiseau, P (Loiseau, P.); Calisti, A (Calisti, A.); Ferri, S (Ferri, S.); Honrubia, J (Honrubia, J.); Kingham, R (Kingham, R.); Mancini, RC (Mancini, R. C.); Gigosos, MA (Gigosos, M. A.); Santos, JJ (Santos, J. J.)

Title: Cylindrical implosion platform for the study of highly magnetized plasmas at Laser MegaJoule

Source: PHYSICAL REVIEW E

Volume: 106

Issue: 3

Article Number: 035206

DOI: 10.1103/PhysRevE.106.035206

Document Type: Article

Published: SEP 19 2022

Abstract: Investigating the potential benefits of the use of magnetic fields in inertial confinement fusion experiments has given rise to experimental platforms like the Magnetized Liner Inertial Fusion approach at the Z-machine (Sandia National Laboratories) or its laser-driven equivalent at OMEGA (Laboratory for Laser Energetics). Implementing these platforms at MegaJoule-scale laser facilities, such as the Laser MegaJoule (LMJ) or the National Ignition Facility (NIF), is crucial to reaching self-sustained nuclear fusion and enlarges the level of magnetization that can be achieved through a higher compression. In this paper, we present a complete design of an experimental platform for magnetized implosions using cylindrical targets at LMJ. A seed magnetic field is generated along the axis of the cylinder using laser-driven coil targets, minimizing debris and increasing diagnostic access compared with pulsed power field generators. We present a comprehensive simulation study of the initial B field generated with these coil targets, as well as two-dimensional extended magnetohydrodynamics simulations showing that a 5 T initial B field is compressed up to 25 kT during the implosion. Under these circumstances, the electrons become magnetized, which severely modifies the plasma conditions at stagnation. In particular, in the hot spot the electron temperature is increased (from 1 keV to 5 keV) while the density is reduced (from 40 g/cm(3) to 7 g/cm(3)). We discuss how these changes can be diagnosed using x-ray imaging and spectroscopy, and particle diagnostics. We propose the simultaneous use of two dopants in the fuel (Ar and Kr) to act as spectroscopic tracers. We show that this introduces an effective spatial resolution in the plasma which permits an unambiguous observation of the B-field effects. Additionally, we present a plan for future experiments of this kind at LMJ.

Accession Number: WOS:000866219300006

PubMed ID: 36266806

Record 29 of 44

By: Ren, GD (Ren, Guodong); Wang, ZC (Wang, ZiCheng); Tian, YF (Tian, Yafei); Li, JY (Li, Jinyao); Ma, YY (Ma, Yingyu); Zhou, L (Zhou, Liang); Zhang, CW (Zhang, Chengwu); Guo, LX (Guo, Lixia); Diao, HP (Diao, Haipeng); Li, LH (Li, Lihong); Lu, L (Lu, Li); Ma, SF (Ma, Sufang); Wu, ZF (Wu, Zhifang); Yan, LL (Yan, Lili); Liu, W (Liu, Wen)

Title: Targeted chemo-photodynamic therapy toward esophageal cancer by GSH-sensitive theranostic nanoplatform

Source: BIOMEDICINE & PHARMACOTHERAPY

Volume: 153

Article Number: 113506

DOI: 10.1016/j.biopha.2022.113506

Early Access Date: AUG 2022

Document Type: Article

Published: SEP 2022

Abstract: As the sixth leading cause of cancer death, esophageal cancer is threatening the life of people worldwide. Traditional treatments, such as surgery, chemotherapy, radiotherapy, are facing always augmented challenges including invasion, multidrug resistance (MDR), off-target toxicity. Chemo & Photodynamic synergistic therapy represents one promising strategy for improved treatment efficiency. But it is still hindered by the lack of tumor targeting, deleterious side effects, and unfavorable microenvironment for photodynamic therapy (PDT). To overcome those obstacles, one theranostic nano-assambly drug, GCDs-Ce6/Pt-EGF, was designed and fabricated. Green fluorescence carbon dots (GCDs) with the excellent optical properties, modifiability and low toxicity were prepared as drug carrier. Epidermal growth factor (EGF) was conjugated to the nano-assembly to realize tumor specific targeting. Chlorin e6 (Ce6) in the presence of laser irradiation achieved PDT by generating proapoptosis reactive oxygen species (ROS). Moreover, Ce6 incorporated into GCDs endowed the nano-assambly imaging ability and facilitate image-guided therapy. Pt(IV), cisplatin prodrug, in the nano-assambly depleted the gluta-thione (GSH) of tumor microenvironment when it was reduced to cytotoxicity Pt(II). Compared with single treatment, GCDs-Ce6/Pt-EGF exhibited enhanced tumor cell killing capacity and better biosafety in vitro and in vivo, especially for EGFR bearing tumor. It paved ways for developing novel theranostic agent to be potentially applied in clinic.

Accession Number: WOS:000878189600002

PubMed ID: 36076595

Record 30 of 44

By: Rigon, G (Rigon, G.); Albertazzi, B (Albertazzi, B.); Mabey, P (Mabey, P.); Michel, T (Michel, Th.); Barroso, P (Barroso, P.); Faenov, A (Faenov, A.); Kumar, R (Kumar, R.); Michaut, C (Michaut, C.); Pikuz, T (Pikuz, T.); Sakawa, Y (Sakawa, Y.); Sano, T (Sano, T.); Shimogawara, H (Shimogawara, H.); Tamatani, S (Tamatani, S.); Casner, A (Casner, A.); Koenig, M (Koenig, M.)

Title: Hydrodynamic instabilities in a highly radiative environment

Source: PHYSICS OF PLASMAS

Volume: 29

Issue: 7

Article Number: 072106

DOI: 10.1063/5.0089994

Document Type: Article

Published: JUL 2022

Abstract: In this paper, we present the effects of a radiative shock (RS) on the morphology of jet-like objects subjected to hydrodynamic instabilities. To this end, we used an experimental platform developed to create RSs on high energy laser facilities such as LULI2000 and GEKKO XII. Here, we employed modulated targets to initiate Richtmyer-Meshkov and Rayleigh-Taylor instability (RTI) growth in the presence of an RS. The RS is obtained by generating a strong shock in a dense pusher that expands into a low-density xenon gas. With our design, only a limited RTI growth occurs in the absence of radiative effects. A strongly radiative shock has opposite effects on RTI growth. While its deceleration enhances the instability growth, the produced radiations tend to stabilize the interfaces. Our indirect experimental observations suggest a lower instability growth despite the interface deceleration. In addition, the jets, produced during the experiment, are relevant to astrophysical structures such as Herbig-Haro objects or other radiatively cooling jets. Published under an exclusive license by AIP Publishing.

Accession Number: WOS:000827598600001

Record 31 of 44

By: Rouze, B (Rouze, Bastien); Fsaifes, I (Fsaifes, Ihsan); Bellanger, S (Bellanger, Severine); Veinhard, M (Veinhard, Matthieu); Rousseaux, T (Rousseaux, Thomas); Primot, J (Primot, Jerome); Chanteloup, JC (Chanteloup, Jean-Christophe); Bellanger, C (Bellanger, Cindy)

Title: Phase noise measurements and diagnoses of a large array of fiber lasers by PISTIL

Source: APPLIED OPTICS

Volume: 61

Issue: 27

Pages: 7846-7851

DOI: 10.1364/AO.466021

Document Type: Article

Published: SEP 20 2022

Abstract: One of the most promising solutions to access high power laser chains is to achieve a coherent combination of a large number of elementary lasers. To interfere constructively, these laser sources should be identical and operate under the same conditions. However, despite these efforts, differential delays appear in the course of time, which must be compensated for. While designing the required correction system, knowing the behavior of a laser as a function of the environmental conditions is not crucial, whereas having access to the differences in the behaviors of identical lasers is, leading to difficulties in modeling. The purpose of this paper is to illustrate how a large set of lasers can be simultaneously analyzed to estimate their variations and optimize a correction system. The X-Coherent Amplified Network laser relies on 61 fiber amplifiers, which are as identical as possible. This state of the art femtosecond digital laser therefore appears as an ideal candidate to study a large number of fiber lasers working under controlled conditions. (C) 2022 Optica Publishing Group

Accession Number: WOS:000883143600006

PubMed ID: 36255898

Record 32 of 44

By: Russman, F (Russman, F.); Marini, S (Marini, S.); Rizzato, FB (Rizzato, F. B.)

Title: A canonical view on particle acceleration by electromagnetic pulses

Source: JOURNAL OF PLASMA PHYSICS

Volume: 88

Issue: 2

Article Number: 905880204

DOI: 10.1017/S0022377822000162

Document Type: Article

Published: MAR 18 2022

Abstract: In the present work we investigate the dynamics of electrons under the action of wave packets of high-frequency electromagnetic carrier waves. When the group velocities of the packets are subluminal, electrons can be efficiently accelerated. We show that the whole process can be described by an accurate ponderomotive canonical formalism that includes relevant extensions of the original ponderomotive approach applied to carriers moving at the speed of light. Single-particle simulations validate our analytical approach and show that extended canonical methods provide better agreement with numerics than previous investigations. In particular, we obtain a precise relationship between the wave amplitude and group velocity for optimum acceleration of initially stationary targets.

Accession Number: WOS:000770281900001

Record 33 of 44

By: Sakai, K (Sakai, K.); Moritaka, T (Moritaka, T.); Morita, T (Morita, T.); Tomita, K (Tomita, K.); Minami, T (Minami, T.); Nishimoto, T (Nishimoto, T.); Egashira, S (Egashira, S.); Ota, M (Ota, M.); Sakawa, Y (Sakawa, Y.); Ozaki, N (Ozaki, N.); Kodama, R (Kodama, R.); Kojima, T (Kojima, T.); Takezaki, T (Takezaki, T.); Yamazaki, R (Yamazaki, R.); Tanaka, SJ (Tanaka, S. J.); Aihara, K (Aihara, K.); Koenig, M (Koenig, M.); Albertazzi, B (Albertazzi, B.); Mabey, P (Mabey, P.); Woolsey, N (Woolsey, N.); Matsukiyo, S (Matsukiyo, S.); Takabe, H (Takabe, H.); Hoshino, M (Hoshino, M.); Kuramitsu, Y (Kuramitsu, Y.)

Title: Direct observations of pure electron outflow in magnetic reconnection (vol 12, 10921, 2022)

Source: SCIENTIFIC REPORTS

Volume: 12

Issue: 1

Article Number: 16501

DOI: 10.1038/s41598-022-21220-5

Document Type: Correction

Published: OCT 3 2022

Accession Number: WOS:000865282300014

PubMed ID: 36192592

Record 34 of 44

By: Sakai, K (Sakai, K.); Moritaka, T (Moritaka, T.); Morita, T (Morita, T.); Tomita, K (Tomita, K.); Minami, T (Minami, T.); Nishimoto, T (Nishimoto, T.); Egashira, S (Egashira, S.); Ota, M (Ota, M.); Sakawa, Y (Sakawa, Y.); Ozaki, N (Ozaki, N.); Kodama, R (Kodama, R.); Kojima, T (Kojima, T.); Takezaki, T (Takezaki, T.); Yamazaki, R (Yamazaki, R.); Tanaka, SJ (Tanaka, S. J.); Aihara, K (Aihara, K.); Koenig, M (Koenig, M.); Albertazzi, B (Albertazzi, B.); Mabey, P (Mabey, P.); Woolsey, N (Woolsey, N.); Matsukiyo, S (Matsukiyo, S.); Takabe, H (Takabe, H.); Hoshino, M (Hoshino, M.); Kuramitsu, Y (Kuramitsu, Y.)

Title: Direct observations of pure electron outflow in magnetic reconnection

Source: SCIENTIFIC REPORTS

Volume: 12

Issue: 1

Article Number: 10921

DOI: 10.1038/s41598-022-14582-3

Document Type: Article

Published: JUN 30 2022

Abstract: Magnetic reconnection is a universal process in space, astrophysical, and laboratory plasmas. It alters magnetic field topology and results in energy release to the plasma. Here we report the experimental results of a pure electron outflow in magnetic reconnection, which is not accompanied with ion flows. By controlling an applied magnetic field in a laser produced plasma, we have constructed an experiment that magnetizes the electrons but not the ions. This allows us to isolate the electron dynamics from the ions. Collective Thomson scattering measurements reveal the electron Alfvenic outflow without ion outflow. The resultant plasmoid and whistler waves are observed with the magnetic induction probe measurements. We observe the unique features of electron-scale magnetic reconnection simultaneously in laser produced plasmas, including global structures, local plasma parameters, magnetic field, and waves.

Accession Number: WOS:000865282200001

PubMed ID: 35773286

Record 35 of 44

By: Sha, WJ (Sha, Weijian); Chanteloup, JC (Chanteloup, Jean-Christophe); Mourou, G (Mourou, Gerard)

Title: Ultrafast Fiber Technologies for Compact Laser Wake Field in Medical Application

Source: PHOTONICS

Volume: 9

Issue: 6

Article Number: 423

DOI: 10.3390/photonics9060423

Document Type: Review

Published: JUN 2022

Abstract: Technologies, performances and maturity of ultrafast fiber lasers and fiber delivery of ultrafast pulses are discussed for the medical deployment of laser-wake-field acceleration (LWFA). The compact ultrafast fiber lasers produce intense laser pulses with flexible hollow-core fiber delivery to facilitate electron acceleration in the laser-stimulated wake field near treatment site, empowering endoscopic LWFA brachytherapy. With coherent beam combination of multiple fiber amplifiers, the advantages of ultrafast fiber lasers are further extended to bring in more capabilities in compact LWFA applications.

Accession Number: WOS:000817573100001

Record 36 of 44

By: Sundstrom, A (Sundstrom, Andreas); Grech, M (Grech, Mickael); Pusztai, I (Pusztai, Istvan); Riconda, C (Riconda, Caterina)

Title: Stimulated-Raman-scattering amplification of attosecond XUV pulses with pulse-train pumps and application to local in-depth plasma-density measurement

Source: PHYSICAL REVIEW E

Volume: 106

Issue: 4

Article Number: 045208

DOI: 10.1103/PhysRevE.106.045208

Document Type: Article

Published: OCT 20 2022

Abstract: We present a scheme for amplifying an extreme-ultraviolet (XUV) seed isolated attosecond pulse via stimulated Raman scattering of a pulse-train pump. At sufficient seed and pump intensity, the amplification is nonlinear, and the amplitude of the seed pulse can reach that of the pump, one order of magnitude higher than the initial seed amplitude. In the linear amplification regime, we find that the spectral signature of the pump pulse train is imprinted on the spectrum of the amplified seed pulse. Since the spectral signature is imprinted with its frequency downshifted by the plasma frequency, it is possible to deduce the electron density in the region of interaction. This region can be of micrometer length scale longitudinally. By varying the delay between the seed and the pump, this scheme provides a local electron-density measurement inside solid-density plasmas that cannot be probed with optical frequencies, with micrometer resolution.

Accession Number: WOS:000876633300002

PubMed ID: 36397490

Record 37 of 44

By: Taleb, H (Taleb, Hussein); Le Blanc, C (Le Blanc, Catherine); Thellier, E (Thellier, Elio); Pichon, P (Pichon, Pierre); Druon, F (Druon, Frederic); Balembois, F (Balembois, Francois); Georges, P (Georges, Patrick)

Title: LED-pumped Cr:LiSAF laser system operating at 100 Hz based on a multipass amplifier

Source: OPTICS LETTERS

Volume: 47

Issue: 14

Pages: 3543-3546

DOI: 10.1364/OL.465115

Document Type: Article

Published: JUL 15 2022

Abstract: The LED-pumping technology is used for the first time, to the best of our knowledge, to develop a complete master oscillator power amplifier (MOPA) system including a multipass amplifier. A pumping head using an original slab architecture is developed integrating a Cr:LiSAF slab pumped by 2112 blue LEDs via a Ce:YAG luminescent concentrator. The slab configuration enables the reaching of a large number of passes-up to 22-together with access to efficient cooling, allowing for a repetition rate scale up. For 22 passes, the amplifier delivers pulses with energy up to 2.4 mi at 10-Hz repetition rate with a gain of 4.36 at 825 nm. A complete study of the MOPA is described, concluding in nearly constant performances versus the repetition rate, up to 100 Hz. (C) 2022 Optica Publishing Group

Accession Number: WOS:000826474100042

PubMed ID: 35838723

Record 38 of 44

By: Umeda, Y (Umeda, Yuhei); Fukui, K (Fukui, Keiya); Sekine, T (Sekine, Toshimori); Guarguaglini, M (Guarguaglini, Marco); Benuzzi-Mounaix, A (Benuzzi-Mounaix, Alessandra); Kamimura, N (Kamimura, Nobuki); Katagiri, K (Katagiri, Kento); Kodama, R (Kodama, Ryosuke); Matsuoka, T (Matsuoka, Takeshi); Miyanishi, K (Miyanishi, Kohei); Ravasio, A (Ravasio, Alessandra); Sano, T (Sano, Takayoshi); Ozaki, N (Ozaki, Norimasa)

Title: Hugoniot and released state of calcite above 200 GPa with implications for hypervelocity planetary impacts

Source: ICARUS

Volume: 377

Article Number: 114901

DOI: 10.1016/j.icarus.2022.114901

Early Access Date: FEB 2022

Document Type: Article

Published: MAY 1 2022

Abstract: Carbonate minerals, for example calcite and magnesite, exist on the planetary surfaces of the Earth, Mars, and Venus, and are subjected to hypervelocity collisions. The physical properties of planetary materials at extreme conditions are essential for understanding their dynamic behaviors at hypervelocity collisions and the mantle structure of rocky planets including Super-Earths. Here we report laboratory investigations of laser-shocked calcite at pressures of 200-960 GPa (impact velocities of 12-30 km/s and faster than escape velocity from the Earth) using decay shock techniques. Our measured temperatures above 200 GPa indicated a large difference from the previous theoretical models. The present shock Hugoniot data and temperature measurements, compared with the previous reports, indicate melting without decomposition at pressures of ~110 GPa to ~& nbsp;350 GPa and a bonded liquid up to 960 GPa from the calculated specific heat. Our temperature calculations of calcite at 1 atm adiabatically released from the Hugoniot points suggest that the released products vary depending on the shock pressures and affect the planetary atmosphere by the degassed species. The present results on calcite newly provide an important anchor for considering the theoretical EOS at the extreme conditions, where the model calculations show a significant diversity at present.

Accession Number: WOS:000793268200004

Record 39 of 44

By: Wheeler, J (Wheeler, Jonathan); Bleotu, GP (Bleotu, Gabriel Petrisor); Naziru, A (Naziru, Andrei); Fabbri, R (Fabbri, Riccardo); Masruri, M (Masruri, Masruri); Secareanu, R (Secareanu, Radu); Farinella, DM (Farinella, Deano M.); Cojocaru, G (Cojocaru, Gabriel); Ungureanu, R (Ungureanu, Razvan); Baynard, E (Baynard, Elsa);

Demailly, J (Demailly, Julien); Pittman, M (Pittman, Moana); Dabu, R (Dabu, Razvan); Dancus, I (Dancus, Ioan); Ursescu, D (Ursescu, Daniel); Ros, D (Ros, David); Tajima, T (Tajima, Toshiki); Mourou, G (Mourou, Gerard)

Title: Compressing High Energy Lasers through Optical Polymer Films

Source: PHOTONICS

Volume: 9

Issue: 10

Article Number: 715

DOI: 10.3390/photonics9100715

Document Type: Article

Published: OCT 2022

Abstract: The thin-film post-compression technique has the ability to reduce the pulse duration in PW-class lasers, increasing the peak power. Here, the nonlinear response of an increasingly available optical thermoplastic demonstrates enhanced spectral broadening, with corresponding shorter pulse duration compared to fused silica glass. The thermoplastic can be used close to its damage threshold when refreshed using a roller mechanism, and the total amount of material can be varied by folding the film. As a proof-of-principle demonstration scalable to 10-PW, a roller mechanism capable of up to 6 passes through a sub-millimeter thermoplastic film is used in vacuum to produce two-fold post-compression of the pulse. The compact design makes it an ideal method to further boost ultrahigh laser pulse intensities with benefits to many areas, including driving high energy acceleration.

Accession Number: WOS:000873430400001

Record 40 of 44

By: Yao, W (Yao, W.); Fazzini, A (Fazzini, A.); Chen, SN (Chen, S. N.); Burdonov, K (Burdonov, K.); Antici, P (Antici, P.); Beard, J (Beard, J.); Bolanos, S (Bolanos, S.); Ciardi, A (Ciardi, A.); Diab, R (Diab, R.); Filippov, ED (Filippov, E. D.); Kisyov, S (Kisyov, S.); Lelasseux, V (Lelasseux, V.); Miceli, M (Miceli, M.); Moreno, Q (Moreno, Q.); Nastasa, V (Nastasa, V.); Orlando, S (Orlando, S.); Pikuz, S (Pikuz, S.); Popescu, DC (Popescu, D. C.); Revet, G (Revet, G.); Ribeyre, X (Ribeyre, X.); d'Humieres, E (d'Humieres, E.); Fuchs, J (Fuchs, J.)

Title: Detailed characterization of a laboratory magnetized supercritical collisionless shock and of the associated proton energization

Source: MATTER AND RADIATION AT EXTREMES

Volume: 7

Issue: 1

Article Number: 014402

DOI: 10.1063/5.0055071

Document Type: Article

Published: JAN 1 2022

Abstract: Collisionless shocks are ubiquitous in the Universe and are held responsible for the production of nonthermal particles and high-energy radiation. In the absence of particle collisions in the system, theory shows that the interaction of an expanding plasma with a pre-existing electromagnetic structure (as in our case) is able to induce energy dissipation and allow shock formation. Shock formation can alternatively take place when two plasmas interact, through microscopic instabilities inducing electromagnetic fields that are able in turn to mediate energy dissipation and shock formation. Using our platform in which we couple a rapidly expanding plasma induced by high-power lasers (JLF/Titan at LLNL and LULI2000) with high-strength magnetic fields, we have investigated the generation of a magnetized collisionless shock and the associated particle energization. We have characterized the shock as being collisionless and supercritical. We report here on measurements of the plasma density and temperature, the electromagnetic field structures, and the particle energization in the experiments, under various conditions of ambient plasma and magnetic field. We have also modeled the formation of the shocks using macroscopic hydrodynamic simulations and the associated particle acceleration using kinetic particle-in-cell simulations. As a companion paper to Yao et al. [Nat. Phys. 17, 1177-1182 (2021)], here we show additional results of the experiments and simulations, providing more information to allow their reproduction and to demonstrate the robustness of our interpretation of the proton energization mechanism as being shock surfing acceleration. (c) 2021 Author(s). All article content, except where otherwise noted, is licensed under a Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

Accession Number: WOS:000729404600001

Record 41 of 44

By: Yao, WP (Yao, Weipeng); Capitaine, J (Capitaine, Julien); Khiar, B (Khiar, Benjamin); Vinci, T (Vinci, Tommaso); Burdonov, K (Burdonov, Konstantin); Beard, J (Beard, Jerome); Fuchs, J (Fuchs, Julien); Ciardi, A (Ciardi, Andrea)

Title: Characterization of the stability and dynamics of a laser-produced plasma expanding across a strong magnetic field

Source: MATTER AND RADIATION AT EXTREMES

Volume: 7

Issue: 2

Article Number: 026903

DOI: 10.1063/5.0058306

Document Type: Article

Published: MAR 1 2022

Abstract: Magnetized laser-produced plasmas are central to many studies in laboratory astrophysics, in inertial confinement fusion, and in industrial applications. Here, we present the results of large-scale three-dimensional magnetohydrodynamic simulations of the dynamics of a laser-produced plasma expanding into a transverse magnetic field with a strength of tens of teslas. The simulations show the plasma being confined by the strong magnetic field into a slender slab structured by the magnetized Rayleigh-Taylor instability that develops at the plasma-vacuum interface. We find that when the initial velocity of the plume is perturbed, the slab can develop kink-like motions that disrupt its propagation.
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Accession Number: WOS:000773883500001

Record 42 of 44

By: Zou, JP (Zou, Ji Ping); Coic, H (Coic, Herve); Papadopoulos, D (Papadopoulos, Dimitris)

Title: Spatiotemporal coupling investigations for Ti:sapphire-based multi-PW lasers

Source: HIGH POWER LASER SCIENCE AND ENGINEERING

Volume: 10

Article Number: e5

DOI: 10.1017/hpl.2021.62

Document Type: Article

Published: JAN 10 2022

Abstract: Emerging multi-PW-class lasers and their envisioned laser-plasma interaction applications in unprecedented intensity regimes set a very demanding frame for the precise understanding of the finest properties of these systems. In this work we present a synthesis of simulation studies on a series of less known or even completely disregarded spatiotemporal effects that could potentially impact greatly the performances of high-intensity lasers.

Accession Number: WOS:000753420900001

Record 43 of 44

By: Zylstra, AB (Zylstra, A. B.); Kritcher, AL (Kritcher, A. L.); Hurricane, OA (Hurricane, O. A.); Callahan, DA (Callahan, D. A.); Ralph, JE (Ralph, J. E.); Casey, DT (Casey, D. T.); Pak, A (Pak, A.); Landen, OL (Landen, O. L.); Bachmann, B (Bachmann, B.); Baker, KL (Baker, K. L.); Hopkins, LB (Hopkins, L. Berzak); Bhandarkar, SD (Bhandarkar, S. D.); Biener, J (Biener, J.); Bionta, RM (Bionta, R. M.); Birge, NW (Birge, N. W.); Braun, T (Braun, T.); Briggs, TM (Briggs, T. M.); Celliers, PM (Celliers, P. M.); Chen, H (Chen, H.); Choate, C (Choate, C.); Clark, DS (Clark, D. S.); Divol, L (Divol, L.); Doppner, T (Doppner, T.); Fittinghoff, D (Fittinghoff, D.); Edwards, MJ (Edwards, M. J.); Johnson, MG (Johnson, M. Gatu); Gharibyan, N (Gharibyan, N.); Haan, S (Haan, S.); Hahn, KD (Hahn, K. D.); Hartouni, E (Hartouni, E.); Hinkel, DE (Hinkel, D. E.); Ho, DD (Ho, D. D.); Hohenberger, M (Hohenberger, M.); Holder, JP (Holder, J. P.); Huang, H (Huang, H.); Izumi, N (Izumi, N.); Jeet, J (Jeet, J.); Jones, O (Jones, O.); Kerr, SM (Kerr, S. M.); Khan, SF (Khan, S. F.); Kleinrath, HG (Kleinrath, H. Geppert); Kleinrath, VG (Kleinrath, V. Geppert); Kong, C (Kong, C.); Lamb, KM (Lamb, K. M.); Le Pape, S (Le Pape, S.); Lemos, NC (Lemos, N. C.); Lindl, JD (Lindl, J. D.); MacGowan, BJ (MacGowan, B. J.); Mackinnon, AJ (Mackinnon, A. J.); MacPhee, AG (MacPhee, A. G.); Marley, EV (Marley, E., V); Meaney, K (Meaney, K.); Millot, M (Millot, M.);

Moore, AS (Moore, A. S.); Newman, K (Newman, K.); Di Nicola, JMG (Di Nicola, J-M G.); Nikroo, A (Nikroo, A.); Nora, R (Nora, R.); Patel, PK (Patel, P. K.); Rice, NG (Rice, N. G.); Rubery, MS (Rubery, M. S.); Sater, J (Sater, J.); Schlossberg, DJ (Schlossberg, D. J.); Sepke, SM (Sepke, S. M.); Sequoia, K (Sequoia, K.); Shin, SJ (Shin, S. J.); Stadermann, M (Stadermann, M.); Stoupin, S (Stoupin, S.); Strozzi, DJ (Strozzi, D. J.); Thomas, CA (Thomas, C. A.); Tommasini, R (Tommasini, R.); Trosseille, C (Trosseille, C.); Tubman, ER (Tubman, E. R.); Volegov, PL (Volegov, P. L.); Weber, CR (Weber, C. R.); Wild, C (Wild, C.); Woods, DT (Woods, D. T.); Yang, ST (Yang, S. T.); Young, CV (Young, C., V)

Title: Experimental achievement and signatures of ignition at the National Ignition Facility

Source: PHYSICAL REVIEW E

Volume: 106

Issue: 2

Article Number: 025202

DOI: 10.1103/PhysRevE.106.025202

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Abstract: An inertial fusion implosion on the National Ignition Facility, conducted on August 8, 2021 (N210808), recently produced more than a megajoule of fusion yield and passed Lawson's criterion for ignition [Phys. Rev. Lett. 129, 075001 (2022)]. We describe the experimental improvements that enabled N210808 and present the first experimental measurements from an igniting plasma in the laboratory. Ignition metrics like the product of hot-spot energy and pressure squared, in the absence of self-heating, increased by -35%, leading to record values and an enhancement from previous experiments in the hot-spot energy (-3x), pressure (-2x), and mass (-2x). These results are consistent with self-heating dominating other power balance terms. The burn rate increases by an order of magnitude after peak compression, and the hot-spot conditions show clear evidence for burn propagation into the dense fuel surrounding the hot spot. These novel dynamics and thermodynamic properties have never been observed on prior inertial fusion experiments.

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Abstract: Obtaining a burning plasma is a critical step towards self-sustaining fusion energy(1). A burning plasma is one in which the fusion reactions themselves are the primary source of heating in the plasma, which is necessary to sustain and propagate the burn, enabling high energy gain. After decades of fusion research, here we achieve a burning-plasma state in the laboratory. These experiments were conducted at the US National Ignition Facility, a laser facility delivering up to 1.9 megajoules of energy in pulses with peak powers up to 500 terawatts. We use the lasers to generate X-rays in a radiation cavity to indirectly drive a fuel-containing capsule via the X-ray ablation pressure, which results in the implosion process compressing and heating the fuel via mechanical work. The burning-plasma state was created using a strategy to increase the spatial scale of the capsule(2,3) through two different implosion concepts(4-7). These experiments show fusion self-heating in excess of the mechanical work injected into the implosions, satisfying several burning-plasma metrics(3,8). Additionally, we describe a subset of experiments that appear to have crossed the static self-heating boundary, where fusion heating surpasses the energy losses from radiation and conduction. These results provide an opportunity to study a-particle-dominated plasmas and burning-plasma physics in the laboratory.

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