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New views of fusion in the sun using studies of the charge symmetric reactions $T(T, {}^4\text{He})2n$ and ${}^3\text{He}({}^3\text{He}, {}^4\text{He})2p$ at laser fusion facilities

We have studied the charge symmetric reactions $T+T$ and ${}^3\text{He}+{}^3\text{He}$ by making measurements at the laser facilities OMEGA at the University of Rochester (NY) and at the National Ignition Facility (NIF) at Lawrence Livermore Laboratory (LLL). We have also made measurements of the ${}^3\text{He}+{}^3\text{He}$ Reaction at the Tandem Van-de-Graff Nuclear Accelerator Laboratory at CalTech. At the laser facilities we have made new, state-of-the-art measurements of the neutron time-of-flight over a wide neutron energy range. We have also made the first measurements of protons from the ${}^3\text{He}+{}^3\text{He}$ reaction using a tagged-recoil magnetic spectrometer. The measurements at the two laser facilities correspond to center-of mass energies close to those in the center of our Sun. At CalTech the energies covered the range between 2 MeV and 12 MeV. Over this energy range the shapes of the observed proton spectra are entirely different from the corresponding spectra (for both neutrons and protons) at solar energies. We will show how the spectra at both facilities can be understood using new theoretical models recently developed by groups at Ohio University (Athens, Ohio) and Los Alamos National Lab (Los Alamos, New Mexico).

Biography

Andrew Bacher has completed his PhD from the California Institute of Technology and NSF-sponsored Post-Doctoral studies at Lawrence Berkeley Laboratory. He is a Professor of Physics (emeritus) at Indiana University. He has published more than 300 papers in refereed journals and has served on program committees at the Los Alamos Meson Facility, the MIT-Bates Electron Scattering Facility and the TRIUMF Meson Facility in Vancouver, British Columbia, Canada.

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