Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Investigation of light ion fusion reactions in metal hydrides with plasma discharges[1] THOMAS SCHENKEL, Lawrence Berkeley National Laboratory, PETER SEIDL, ARUN PERSAUD, QING JI, LBNL — Fusion at relatively low energies is important for our understanding of stellar fuel chains and the development of future energy technologies. Experiments are challenging due to the exponential drop of fusion cross sections below the Coulomb barrier. We report on experiments on D-D fusion with ion pulses from glow discharge plasmas [1]. With this approach we can deliver relatively high peak ion currents (0.1 to several A/cm^2) to metal wire cathodes for several days. With Pd targets, we find neutron yields that are over 100 times higher than expected for bare nuclei fusion at ion energies below 2 keV (cm-frame). A possible explanation is a correction to the ion energy due to an apparent electron screening potential of 1000+/-250 eV, which increases the probability for tunneling through the repulsive Coulomb barrier. But such a high value is not consistent with theoretical descriptions of electron screening potentials. We discuss possible explanations, ideas of treating metals as analogs of cold, dense plasmas and follow-up experiments aimed at understanding this effect. [1] T. Schenkel, et al., https://arxiv.org/abs/1905.03400; C. P. Berlinguette, et al., Nature 570, 45 (2019)

[1]This work was funded by Google LLC under a CRADA between LBNL and Google LLC. LBNL operates under U.S. DOE contract DE-AC02-05CH11231.

Thomas Schenkel
Lawrence Berkeley National Laboratory

Date submitted: 02 Jul 2019 Electronic form version 1.4