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An NToF Suite to Measure Ion Temperature at the Z-Facility[1]
GARY GRIM, Lawrence Livermore Natl Lab, DAVID AMPLEFORD, GORDON CHANDLER, MICHAEL JONES, Sandia National Laboratories, KELLY HAHN, EDWARD HARTOUNI, KEITH LECHIEN, JAMES MITRANI, ALASTAIR MOORE, Lawrence Livermore Natl Lab — Neutron time-of-flight diagnostic techniques have been employed for over 50 years of fusion experiments. In 2016 Munro[1] documented the non-thermal contributions to the neutron fusion peak spectral variance leading to the result that a single sample along a single line-of-sight is insufficient to determine T_{ion} in all but the most unlikely of conditions. This ambiguity is endemic to all systems of rapid fuel assemby due to incomplete conversion of directed kinetic energy into heat. Use of multiple lines-of-sight and measurements can reduce the ambiguity and uncertainty to a level sufficient to achieve a desired task. Presented is a strategy for a new nToF suite for the Z-facility at Sandia National Laboratory, in Albuqueque, NM. This new suite leverages technologies from the National Ignition Facility at Lawrence Livermore National Laboratory and deploys these in a geometric configuration that enables T_{ion} measurement using either D_2 or DT fusing plasmas. The strategy and logic for the design, along with estimates of precision will be presented. [1] "Impact of temperature-velocity distribution on fusion peak shape", D. H. Munro et al. Phys. Plasmas, 24, 056301, (2017).

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