Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Evidence for a ^{7}Li state at E* = 10.2 MeV from inelastic neutron scattering at 14 MeV[1] CHAD FORREST, Laboratory for Laser Energetics, GERRY HALE, Los Alamos National Laboratory, UDO SCHROEDER, University of Rochester, JAMES KNAUER, RADHA BAHUKUTUMBI, VLADIMIR GLEBOV, OWEN MANNION, ZAARAH MOHAMED, SEAN REGAN, THOMAS SANGSTER, ARNOLD SCHWEMMLEIN, CHRISTIAN STOECKL, Laboratory for Laser Energetics — A bright neutron source generating 10^{11} incident particles, produced in inertial confinement implosions[2] by the OMEGA laser, were used to irradiate an isotopically enriched ^{7}Li target. Absolute yields and energy spectra were measured for neutrons emitted from interactions of 14-MeV neutrons with ^{7}Li in a forward-angle geometry (θ = 0 to 7.4) with a neutron time-of-flight spectrometer. The data were analyzed with an R-matrix calculation using a single-level, single-channel approximation to interpret the level structure of ^{7}Li. The inferred differential neutron cross section reveals several ^{7}Li resonances in the range 4 MeV $\leq$ E* $\leq$ 12 MeV, attributed to inelastic ^{7}Li(n,n')^{7}Li scattering. In addition, a neutron line with significant cross section is observed at E_n = 3.5 MeV and a width of $E_\Gamma \leq$ 0.9 MeV, which may correspond to excitation of a ^{7}Li state at E* = 10.2 MeV. It is tempting to identify this state with a narrow resonance at E* = 10.2 MeV, predicted[3] by a no-core shell model with continuum (NCSMC) to exist just above the threshold for the mass partition of p + ^{6}He reaction. However, the measured linewidth is larger than that (E_Γ = 0.13 MeV) predicted by the NCSMC model. This material is based upon work supported by the DOE NNSA under Award Number DE-NA0003856.

[1]Evidence for a 7Li state at E* = 10.2 MeV from inelastic neutron scattering at 14 MeV

[2]T. R. Boehly *et al.*, Opt. Commun. **133**, 495 (1997).
[3]M. Vorabbi *et al.*, Phys. Rev. C **100**, 024304 (2019).

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Date submitted: 10 Jan 2020 Electronic form version 1.4