Progetto per borse CSN3 per gli studenti della laurea magistrale	
Titolo del progetto:	ADONIS: Aluminum DestructiON In Stars
Esperimento/Sigla proponente:	ASFIN2
Laboratorio ospitante:	LNS
Contact person presso il laboratorio	M. La Cognata
Periodo previsto:	Marzo settembre 2025
Sezioni e tutor proponenti:	LNS Pizzone PD Mazzocco PG Palmerini NA La Commara
Descrizione attività (max 1000 caratteri):	The radioisotope ^{26}Al is of outstanding importance in astrophysics, as it plays a key role in constraining the circumstances and conditions of the solar system birth and of the chemical evolution of the Galaxy. Among others, ^{26}Al abundance is used to constrain the neutron star formation rate in our Galaxy, which is a key parameter in the field of Multimessenger Astronomy. Also, ^{26}Al is the most likely heat source for melting, differentiation and crust formation of planetary bodies in the early Solar System. To ascertain the most likely ^{26}Al nucleosynthesis scenario, the ^{26}Al production and destruction mechanisms will be investigated, in the energy range up to about 1 MeV. Two reactions strongly affect ^{26}Al nucleosynthesis, the ^{26}Al(n,p)^{26}Mg and the ^{26}Al(n,α)^{23}Na [1]. The Trojan Horse Method (THM) [2] will be used for their study, using deuterons to transfer a neutron and populate ^{27}Al excited states, later decaying to the p+^{26}Mg and α+^{23}Na channels. The method offers a great advantage with respect to direct approaches, thanks to the possibility to run at energies much higher than those of astrophysical interest, and to the capability of removing background sources. Within this framework, a high granularity detection setup will be used (NEFASTA: NEar FAr Silicon Telescope Array). The candidate student will work on the development of algorithms for the detector calibration, starting from a variety of experimental data including sources, reactions, and scattering processes, with the aim to determine solid angles and fine angular corrections based on reaction kinematics. This is a key point in the THM application, fixing the new resonances discovery capability of NEFASTA. [1] C. Iliadis et al, Astrophys. J. Suppl. Series 193, 16 (2011). [2] R.E. Tribble et al., Rep. Prog. Phys. 77, 106901 (2014).
Altre indicazioni (max 500 caratteri):	Basic knowledge of C++, GEANT4 and ROOT
Facility che il laboratorio ospitante mette a disposizione:	Buoni pasto
Note:	L'esperienza svolta presso il laboratorio ospitante può essere parte integrante della attività richiesta per un progetto di tesi magistrale.