Direct measurement of the ^{19}F(p,α)^{16}O reaction using the LHASA detector array

T. Petruse,[1] G. L. Guardo,[1] M. La Cognata,[2] D. Lattuada,[1] C. Spitaleri,[2] D. Balabanski,[1] E. Aciksoz,[1] L. Acosta,[3] L. Capponi,[1] D. Carbone,[2] S. Cherubini,[2] D. Choudhury,[1] G. D'Agata,[4] A. Di Pietro,[2] P. Figuera,[2] M. Gulino,[2] A. I. Kilik,[4] M. La Commara,[5] L. Lamia,[2] C. Matei,[1] S. Palmerini,[6] R. G. Pizzone,[2] S. Romano,[2] P.-A. Soderstrom,[1] R. Sparta,[2] A. Tumino,[2] and S. Vinales Onses[7]

[1]*Extreme Light Infrastructure - Nuclear Physics / IFIN-HH, Magurele, Romania*

[2]*Laboratori Nazionali del Sud - INFN, Catania, Italy*

[3]*National Autonomous University of Mexico, Mxico D.F., Mxico*

[4]*Nuclear Physics Institute of ASCR, Rez, Czech Republic*

[5]*Universita di Napoli Federico II, Napoli, Italy*

[6]*INFN - Sezione di Perugia, Perugia, Italy*

[7]*Consejo Superior de Investigaciones Cientficas, Madrid, Spain*

The cosmic origin of fluorine is highly uncertain. Its production and destruction is strictly connected to the physical conditions in stars, and because of this, the fluorine abundance will place a severe constraint on stellar evolution models. The main fluorine destruction channel in the H-rich layer of an Asymptotic Giant Branch (AGB) star is the ^{19}F(p,α)^{16}O reaction. At present time, theoretical models predict larger fluorine abundances than observed in AGB stars. This discrepancy requires a revision of the nuclear reaction rates involved in the production and destruction of fluorine. In 2015, new measurements of the ^{19}F(p,α)^{16}O reaction at deep sub-Coulomb energies were performed by Lombardo et. al. Unfortunately, those data are larger by a factor of 1.4 with respect the previous data reported in the NACRE compilation in the energy region 0.6-0.8 MeV. Using the Large High Resolution Array of Silicons for Astrophysics (LHASA), we performed a new direct measurement of the ^{19}F(p,α)^{16}O. The goal of this experiment is to reduce the uncertainties in the nuclear reaction rate of the ^{19}F(p,α)^{16}O reaction. Experimental details, calibration procedure, angular distributions and some preliminary results will be presented.