Contribution ID: **285** Type: **Oral contribution**

α-cluster structure of 18Ne

Friday 1 July 2022 12:00 (20 minutes)

We studied alpha-clustering in 18Ne and compared it with alpha-clustering in the mirror nucleus 18O. To the best of our knowledge, this is one of the first detailed experimental studies of clustering phenomena in mirror systems. The excitation function for α+14O resonant elastic scattering was measured in the energy range from 7.5 to 17 MeV. Measurements were performed at the Texas A&M University Cyclotron Institute using TexAT [1] active target detector. Detailed spectroscopic information on the populated excited states in 18Ne was obtained from the R-matrix analysis and compared to similar data on the states in 18O reported by Avila et al. [2].

A good correspondence between the levels in 18O and 18Ne is observed, as is expected due to isospin symmetry. We carried out an extensive shell model analysis based on the configuration interaction technique [3]. Comparing experimental results with theory, we notice a remarkably good agreement between the predicted and observed states allowing further configurational categorization of the strong cluster states. There is also an indication that the super-radiance mechanism is essential in generating clustering in 18Ne and 18O. Our data indicate that, in mirror states, the state with the largest alpha partial width is also the one with the largest spectroscopic factor. Super-radiance may, in principle, explain this trend. Experimental results and a comparison with theory will be presented.

[1] E. Koshchiy, et al., Nucl. Inst. and Methods in Physics Research A 957, 163398 (2020).
[2] M. L. Avila et al., Phys. Rev. C 90, 024327 (2014).
[3] K. Kravvaris, A. Volya, Phys. Rev. C 100, 034321 (2019).

Topic

Experiment

Author: Dr BARBUI, Marina (Cyclotron Institute, Texas A&M University)

Co-authors: Prof. VOLYA , A; ABOUD, E; AHN, S; BISHOP, J; GOLDBERG, V.Z; HOOKER , J; HUNT, C.H; JAYATISSA, H; KOKALOVA, Tz; KOSHCHIY, E; PIRRIE, S; POLLACCO, E; ROEDER, B.T; UPADHIAYULA, S; WHELDON, C; SAASTAMOINEN, A; ROGACHEV, G.V

Presenter: Dr BARBUI, Marina (Cyclotron Institute, Texas A&M University)

Session Classification: FRI1