



Contribution ID: 285

Type: **Oral contribution**

α -cluster structure of ^{18}Ne

Friday, 1 July 2022 12:00 (20 minutes)

We studied alpha-clustering in ^{18}Ne and compared it with alpha-clustering in the mirror nucleus ^{18}O . 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 $\alpha+^{14}\text{O}$ 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 ^{18}Ne was obtained from the R-matrix analysis and compared to similar data on the states in ^{18}O reported by Avila et al. [2].

A good correspondence between the levels in ^{18}O and ^{18}Ne 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 ^{18}Ne and ^{18}O . 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

Primary 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; UPADHIYAYULA, S; WHELDON, C; SAASTAMOINEN, A; ROGACHEV, G.V

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

Session Classification: FRI1