Contribution ID: **56** Type: **Invited Presentation**

Transition Strengths in 22,23Mg as Tests of ab Initio Theory

Tuesday, 30 May 2017 17:20 (15 minutes)

Recent theoretical developments in ab initio nuclear theory techniques make calculations of the properties of sd-shell nuclei possible without a reliance on phenomenology. In particular, in-medium similarity renormalization group (IM-SRG) and coupled-cluster theory have demonstrated promising results in describing the collective properties of nuclei, for example in self-conjugate 20Ne and 24Mg [1, 2, 3]. In principle, such techniques might allow for the elimination of phenomenological effective charges, accounting for physics lost in model truncations by correctly evolving the necessary operators.

Two Coulomb-excitation measurements were performed with the TIGRESS setup at the TRIUMF ISAC-II facility with the goal of providing precise E2 transition strengths in 22,23Mg to allow for more detailed scrutiny of results from modern, ab initio methodologies. Furthermore, in a previous measurement an apparent deviation in the ratio of isoscalar and isovector contributions to the E2 transition strength was observed in 21Na [4]. The results of the present measurement will be used to determine whether this deviation extends to neighbouring nuclides.

The results of the two measurements will be presented and compared with modern nuclear theory, both ab initio and phenomenological, including a first measurement of the sign of the diagonal matrix element of the first-excited 2+ state in 22Mg through the reorientation effect. Results will be presented in the context of other Tz = −1,−1/2 isotopes, providing for a systematic evaluation of transition strengths within the sd-shell.

References:

[1] S. R. Stroberg et al., Phys. Rev. C 93 051301R (2016).

[2] S. R. Stroberg et al., Phys. Rev. Lett. 118, 032502 (2017).

[3] G. R. Jansen et al., Phys. Rev. C 94 011301R (2016).

[4] M. A. Schumaker et al., Phys. Rev. C 78 044321 (2008).

Primary authors: Dr HACKMAN, Greg (TRIUMF); Dr HENDERSON, Jack (TRIUMF)

Co-authors: Dr GARNSWORTHY, Adam (TRIUMF); DIAZ VARELA, Alejandra (University of Guelph); Dr KILIC, Ali (University of Guelph); Dr OLAIZOLA, Bruno (TRIUMF); Dr WU, Ching-Yen (Lawrence Livermore National Laboratory); Prof. ANDREOIU, Corina (Simon Fraser University); Prof. MÜCHER, Dennis (University of Guelph); Ms O'SULLIVAN, Elizabeth (University of Waterloo); Dr ALI, Fuad (University of Guelph); Mr MEASURES, James (University of Surrey); Dr SMALLCOMBE, James (TRIUMF); Mr PARK, Jason (TRIUMF/University of British Columbia); Dr WHITMORE, Kenneth (Simon Fraser University); Mr EVITTS, L. J. (TRIUMF / University of Surrey); Dr HOLL, Matthias (TRIUMF/Saint Mary's University); Prof. BENTLEY, Michael (University of York); Dr BOWRY, Michael (TRIUMF); Ms BERNIER, Nikita (TRIUMF/University of British Columbia); Mr PAETKAU, Owen (Thompsons Rivers University); Dr RUOTSALAINEN, Panu (University of Jyvaskyla); Prof. GARRETT, Paul (University of Guelph); Dr STROBERG, Ragnar (TRIUMF); Ms FREDERICK, Rebecca (University of Guelph); Prof. WADSWORTH, Robert (University of York); Dr CABALLERO FOLCH, Roger (TRIUMF); Mr CRUZ, Steffen (TRIUMF/University of British Columbia)

Presenter: Dr HENDERSON, Jack (TRIUMF)

Session Classification: Breakout 2