Contribution ID: **94** Type: **not specified**

Study of the isospin symmetry in N=Z nuclei

Thursday, 6 September 2018 14:20 (20 minutes)

In Nature, symmetries help us to describe a complex physical system in a simple way and to better understand its behaviour. The search for symmetries is a fundamental goal in all fields in physics. At the same time, the possible breaking of a symmetry can open the gates for new and unexpected scenarios. In a nuclear system the isospin symmetry plays a key role in nuclear structure and nuclear reaction. In atomic nuclei, however, the presence of the Coulomb interaction between protons breaks this symmetry and induces a mixing between nuclear states with different isospin values. In this situation it is impossible to assign to a nuclear state a unique value of the isospin. This phenomenon is called isospin mixing.
The breaking of the isospin symmetry can be observed through decays which would be inhibited by isospin selection rules. This is the case of the electric dipole transition (E1 transition) from self-conjugate nuclei in a I = 0 configuration. To fully exploit this property, one should go in the region of the Giant Dipole Resonance (GDR), where most of the E1 strength is concentrated. This approach has been employed to measure the isospin mixing in nuclei formed in fusion-evaporation reactions. In this type of experiments the use of self-conjugate projectile and target nuclei ensures the population of a compound nucleus (CN) with I = 0. The hindrance of the GDR gamma decay can be measured and thus the isospin-mixing amplitude deduced. A partial restoration of the isospin symmetry is expected at high excitation energy because of the decrease of CN lifetime for particle decay.
The knowledge of the isospin mixing is important both to explain the properties of the isobaric analogue state (IAS) and for its connection with the test of the unitarity of the Cabibbo-Kobayashi- Maskawa matrix (CKM). In the present case, I will present recent experimental results obtained in 80Zr (AGATA cam- paign at Laboratori Nazionali di Legnaro (LNL)) and preliminary results obtained in 60Zn during the GALILEO campaign at LNL. In particular, the study of the dependence of isospin-symmetry breaking with the nuclear excitation energy and how this affects the GDR gamma decay will be reported.

Selected session

Nuclear structure and dynamics
Fundamental symmetries

Primary author: Dr CERUTI, Simone (Università degli Studi di Milano INFN Milano)

Presenter: Dr CERUTI, Simone (Università degli Studi di Milano INFN Milano)

Session Classification: Fundamental Symmetries