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On the nature of the low-energy E1 strength in the unstable nucleus ^{68}Ni

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The low-energy E1 strength, known as Pygmy Dipole Resonance (PDR) is an excitation mode connected to the neutron excess in nuclei. This mode is carrying few per cent of the isovector Energy Weighted Sum Rule (EWSR) and it is predicted to be present in all stable nuclei with neutron excess and in particular for unstable nuclei [1,2]. The study of this mode and the knowledge about the structure are very important also due to the connection with the Equation of state of nuclear matter (EoS), indeed this mode is used as a further tool to constrain it [3,4]. Moreover, the PDR is connected also to the r- process, responsible for the nucleosynthesis of the heavy elements [5]. Due to the properties of its transition densities this mode can be populated by both isoscalar and isovector probes [6]. Several experiments, with both the probes, have been performed on stable nuclei [1, 3] and on unstable nuclei by using Coulomb excitation [7]. Despite these different experimental studies the situation regarding the characterization of the PDR is not conclusive. At the LNS-INFN of Catania we have performed an experiment, using the unstable projectile ^{68}Ni and an isoscalar ^{12}C target, with the aim to study the PDR on the ^{68}Ni by using an isoscalar probe. We produced the ^{68}Ni by exploiting the projectile In Flight Fragmentation method in the dedicated FRIBs transport line. The CHIMERA multidetector [8] and the FARCOS array [9] were used to detect reaction products. We report on the results about the gamma-decay channel of the Pygmy Dipole Resonance [10] and the preliminary results about the study of the neutron decay channel.

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Selected session

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