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## Collective Modes studies at the CCB in Krakow

The atomic nuclei, although they are quantal objects, may exhibit many features, which are known from the macroscopic world. To one of them belong different types of collective vibration, known as Giant Resonances, or recently studied, and important for the understanding of the creation of elements in the Universe, so called Pygmy Resonances. The studies of the gamma decay of the Giant and Pygmy Resonances continue to be the hot topics, and are conducted by many groups in the world.

Recently this topic became one of the main research subjects at the proton therapy center CCB (Cyclotron Center Bronowice) at IFJ PAN Krakow. This facility became recently one of the Transnational Access facilities of the EC EURO-LABS project. The collective vibrations in stable nuclei were excited via the inelastic scattering of the fast (70-230 MeV) protons from the Proteus cyclotron in CCB. The scattered protons were detected in the detector KRATTA (Krakow Array of Triple Telescope Array), providing information of the excitation energy. The high-energy gamma-rays were measured in the 2 PARIS (Photon Array for studies with Radioactive Ion and Stable beams) clusters and 4 large volume LaBr3 scintillators.

In the talk I will summarize the status of the current knowledge of Collective Vibrational Modes (Giant and Pygmy Resonances), I will describe the proton therapy facility in Krakow and the recently achieved results from the studies of the gamma decay of Giant Quadrupole Resonances and Pygmy Resonances, brief description of other research topics conducted at CCB, as well as the research plans for the near future. I will also mention the access opportunities within the EURO-LABS project

In addition, if time permits, I will inform about the status and plans of constructing the PARIS array, being essential for the Collective Vibrational Modes studies in Krakow and other facilities in Europe.

### Attendance Type

In-person

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