^{2}He Decay from ^{18}Ne Excited States: Status and Perspectives

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We will report on the first experimental evidence for diproton emission from the 6.15 MeV ^{18}Ne (1^{-}) level. The secondary ^{18}Ne beam was produced using the in-flight FRIBs facility of the Laboratori Nazionali del Sud in Catania. ^{18}Ne levels were populated by Coulomb excitation on a ^{nat}Pb target. Several levels were identified in the excitation energy spectrum built by kinematic reconstruction from the ^{17}F+p and ^{16}O+2p fully measured decay events. The study of the relative momentum and angle correlation of the two protons, analysed in the excitation energy window 5.9<E*<6.5 MeV, clearly disentangles the diproton and democratic or virtual sequential decay mechanisms contributions to the 2p emission. Moreover, in the ^{16}O+2p decay channel the population of high-lying known and unknown states in ^{18}Ne Coulomb excitation was observed[1]. New analysis on data obtained in a recent experiment seems to indicate the possibility that correlated two protons emission occurs in such states despite the predominant democratic or true sequential three-body mechanism. This observation provide new hints for the interpretation of the phenomenon.

[1] G. Raciti *et al.*, Phys. Rev. Lett. **100**, 192503 (2008).