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Study of pairing in light nuclei and clusterization through nuclear break-up.

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Nuclear break-up occurring at few tens of MeV per nucleon is an efficient tool to study clusterization into nuclei. A landscape of information extracted through nuclear break-up will be given.

Firstly, spatial pairing correlation can be studied. Pairing plays an important role to understand various aspect of nuclear physics but also nuclear astrophysics. Halo nuclei are the best place to study pairing effect in low-density matter. The case of ^{6}He borromean nucleus was investigated at GANIL with an exclusive measurement in order to disentangle between the di-neutron and cigar configuration [1]. A theoretical reaction model going beyond mean-field was developed to understand the experimental data [2]. It shows very strong di-neutron contribution.

The alpha clusterization phenomenon was also studied in ^{40}Ca and ^{40}Ar to compare this effect in symmetric and asymmetric matter. The angular distribution of the emitted alpha particle are compared to Time Dependent Schrödinger Equation calculations to extract spectroscopic factors for the ground state [3].

According to AMD calculations, clusterization may show up in light nuclei close to the driplines. In the future, studies of isotopic chains up to the dripline are foreseen.

[1] M. Assié *et al, EPJA 42, 441–446 (2009).*
[2] M. Assié, D. Lacroix, *PRL 102, 202501 (2009).*
[3] J.-A. Scarpaci *et al, PRC 82 031301(R) (2010).*