Study of the N = 16 shell gap with the one neutron transfer reaction ^{26}Ne (d,p) ^{27}Ne

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Recently, the neutron number N = 16 has been proposed to be a magic number for nuclei far from the stability, with the possibility of a new doubly magic nucleus, ^{24}O. In terms of the standard shell model, this would correspond to an enhanced energy gap between the filled $\nu d_{5/2}$ and $\nu s_{1/2}$ orbitals and the unoccupied $\nu d_{3/2}$ and higher lying fp orbitals. Therefore, for N = 17, the energy difference between the expected $3/2^+$ ground state and the negative parity states is an information about the strength of this gap. That difference is large for stable nuclei but might be substantially reduced for the most exotic nuclei like the unbound ^{25}O. ^{27}Ne could be a transitional nucleus : its spectroscopy, largely unknown, has been investigated in the one neutron transfer reaction ^{26}Ne (d,p) ^{27}Ne with the ^{26}Ne beam at 10 MeV/A delivered by the SPIRAL facility at GANIL.

We used a solid cryogenic deuterium target and measured the coincidences between the ejectile ^{27}Ne and the photons emitted in flight. ^{27}Ne was detected and identified with the VAMOS magnetic spectrometer and its standard detection. The photons were measured with the EXOGAM array around the target with an appropriate Doppler correction.

Results and first analysis will be presented.