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155,157Gd neutron capture cross sections measured at n_TOF (CERN)

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Fuel assemblies (FAs) of current Thermal Reactors such as Pressurized Water Reactors (PWRs) and Boiling Water Reactors (BWRs) make extensive use of the so-called “burnable neutron poisons”, i.e. isotopes characterized by a very high neutron capture cross section at thermal energy, so as to compete with the fissile ^{235}U isotope in neutron absorption. One element that can be conveniently used as neutron poison is Gadolinium, thanks to the very large thermal neutron capture cross section of its odd isotopes ^{155}Gd and ^{157}Gd . For these properties, Gadolinium is also often used in neutron and, more recently, in neutrino detection, as well as in medical applications. The accurate knowledge of the neutron capture cross section of ^{155}Gd and ^{157}Gd is extremely important for assessing the performances and safety features of FAs and of the whole reactor core, as well as for reliable simulations of the neutron transport in the presence of Gd for other applications. Despite the importance of this cross section, only few experimental data are available on these two isotopes in the low energy region. For this purpose, a measurement of the neutron capture cross-sections of the two odd Gd isotopes was carried out at the experimental area (EAR1) of the n_TOF facility at CERN (Geneva). In this talk, the main results obtained in the thermal region as well as in the resolved resonance region (RRR), will be presented.

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