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# Neutron induced reactions studies in the 1-200 MeV energy range.

The neutron is a wonderful tool for numerous topics like fundamental research, material science, biology, nuclear technology…. Neutrons are used on a very wide energy range from neV up to the GeV region. The (1-200MeV) energy range is of prime interest because it plays a role in many applications like therapy, single event upsets, fission and fusion technology… All these applications require accurate evaluated nuclear data libraries based on measurements and reaction models. In this region many threshold reactions are possible like (n,n'g), (n,xn), (n,lcp) or multiple chances of fission. Several reaction mechanisms take place (direct reaction, pre-equilibrium process, fission…) and are not well reproduced by simulation codes. New accurate measurements are needed to improve nuclear data libraries and theoretical models.
Very few facilities around the world deliver neutrons beam up to 200 MeV and there is an opportunity for iThemba laboratory to upgrade its neutron facility. Indeed the proton beam accelerated by the cyclotron can produce quasi-mono-energetic neutrons as well as continuous energy spectra. Neutron flux and spectrum are not the only important parameters, the time structure, the experimental room size and design are also key characteristics for the realization of complex experiments. The use of gamma rays and neutron detectors for example requires very specific background characteristics.
Some examples of studies which could be performed in the 1-200 MeV region will be presented. We will show how the iThemba facility could be complementary to the existing facilities and what could be its added value. The requested properties of the facility will be shown by taking example of facilities already running or under development.

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