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# First steps toward the development of SONATE, a Compact Accelerator driven Neutron Source

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Facilities providing bright thermal neutron beams are of primary importance for various research topics such as condensed matter experiments, neutron-imaging or medical applications. Currently these are mainly spallation sources and nuclear reactors. However, these later facilities are aging and the political context does not favor the building of new ones. This is the case in CEA-Saclay (France), where the Orphee reactor is planned to shutdown in 2019. Therefore, another local facility, affordable by one country, able to provide high brilliance neutron beams has to be built. At CEA-Saclay, a compact accelerator driven neutron source, SONATE, is investigated in taking advantage of the IPHI accelerator able to deliver a 3 MeV proton beam with an intensity up to 100 mA. In the future, SONATE is foreseen to operate with 20 MeV protons to increase the neutron brightness. In addition to the difficulties to operate such high intensity accelerators, the other challenges regard the target-moderator-reflector (TMR) design which is crucial to maximize the neutron flux at the detector location. At CEA-Saclay, with the IPHI accelerator several experiments were performed between 2016 and 2019 and Geant4 simulations are developed to demonstrate the feasibility and to find the best TMR configuration for the future SONATE facility. These developments will be reported as well as the future steps expected to be performed.

## Poster back-up

No

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