

# Design and prototyping of neutron diagnostics for the SPARC tokamak

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SPARC is a high field, compact tokamak, under construction in Devens Massachusetts, targeting a  $Q > 1$  in late 2026-early 2027. It leverages multi-instrument measurements of the neutron yield rate, energy spectrum, and spatial emission profile; to estimate the fusion power, study the physics of plasma burn, validate the neutronics design toolkits, and provide machine protection warnings. This talk discusses the four redundant and complementary systems developed for the SPARC neutron diagnostics, and how the design process is adapting to the demanding target uncertainties, wide dynamic ranges, and the short crunch time to finalize and produce the components. It covers the various detector types considered, beam line engineering, simulation and analytical methods used, prototyping activities underway at various partner facilities, and the preliminary plans for calibration.

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