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Astrophysics and beyond the Standard Model of particle physics in the NOvA experiment

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NOvA is currently operating 2nd generation long-baseline neutrino oscillation experiment, based on NuMI complex at Fermilab (USA), having two large highly-segmented liquid scintillator detectors it has precise capability to measure neutrino's and many other particle physics aspects. During the last several years NOvA have got and published important results on neutrino oscillation properties for both so-called active and sterile neutrinos, as well as neutrino interaction cross-section with matter, on astrophysics topics and beyond known properties of the matter. NOvA goals include Astrophysical and Beyond the Standard Model program, what contains searches for magnetic monopoles, dark matter, neutron-antineutron oscillation and any types of so-called exotics signals, supernova neutrino detection, multi-messenger astronomy, and detailed characterisation of the cosmic ray fluxes. Several analysis already show promising interim results and the physics potential of them continues to improve with exposure, operating until late mid-twenties. Next generation experiments are planned and built as multipurpose projects, often involving many parallel studies in particle physics and astrophysics. The potential of some of them for dark matter, physics beyond the standard model, and other exotic searches will be considered in the talk.

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