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Producing ultracold neutrons with a spallation source and superfluid helium

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Ultracold neutrons are an ideal tool to do precise measurements of fundamental properties of the neutron. However, such measurements are currently limited by the small number of ultracold neutrons that the handful of operational sources worldwide can provide.
The TRIUMF UltraCold Advanced Neutron (TUCAN) collaboration has recently produced the first ultracold neutrons at TRIUMF, using a new, dedicated spallation neutron source and superfluid helium to convert them to ultracold energies. Based on the same principles and the experience gained with this prototype, we are currently designing a new ultracold-neutron source that will go into operation in 2021 and provide the highest UCN density in the world.
This presentation will show results of the first UCN-production runs at TRIUMF, compare them to simulations, and show how we use these simulations to optimize the new source.

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