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Towards the engineering design of the next-generation spallation neutron source at LANSCE

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We will review key features of the physics design of the next-generation spallation neutron Target-Moderator-Reflector-Shield (TMRS) assembly Mark-IV for the Manuel Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center (LANSCE). The new TMRS was designed to improve the neutronic performance in the keV to MeV energy region to advance a variety of nuclear physics experiments, such as neutron capture and transmission measurements. The optimized physics design predicts an increase in neutron flux and improvement in energy resolution both by a factor of 10 at the neutron energy 100 keV. However, to ensure sufficient heat removal from the new solid tungsten target and to support the necessary pressure of the cooling water, we had to modify the physics design at a cost of neutronic performance. We will discuss the major modifications to the physics design as it evolved into more robust, engineering design, while still offering a significant neutronic improvement in comparison with the current TMRS Mark-III.

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