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Development of a High Intensity Moderator for ESS

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The European Spallation Source will be the most powerful neutron source in the world for condensed matter studies. The design of ESS moderator system to deliver thermal and cold neutrons to the instruments was based on the novel concept of low-dimensional moderators which led, after an intense design effort, to a single high-brightness moderator system placed on top of the spallation target. All of the first 15 instruments built, plus a test beam line, will view that moderator. The facility was designed, however, having in mind possible upgrades without the need to build a second target station. In this respect, two design features of ESS are particularly remarkable: 42 beamports placed around the spallation target in approximately uniform grid, leaving upgrade areas available for future instruments; the beam extraction system which allows for neutron extraction below the target, where another moderator system can be placed in the future. Currently, we are investigating possibilities for this second moderator system, and one option is to develop a high-intensity moderator for applications such as fundamental physics, imaging, and spin-echo. A promising candidate for such moderator is a large liquid deuterium moderator, which is expected to deliver about 3 times the intensity of the top, 3 cm high, moderator. A preliminary study of the design and performance of this moderator suite will be presented.

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