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Muon spin rotation measurements of the vortex core size in single-gap and multi-gap type-II superconductors FERGAL CALLAGHAN, MIKKO LAULAJAINEN, CHRISTINA KAISER, JEFF SONIER, Simon Fraser University, Burnaby, BC, Canada, ROGER MILLER, TRIUMF, 4004 Wesbrook Mall, Vancouver, BC, Canada — We present muon spin rotation (μ SR) measurements of the vortex core size in the single-gap superconductor V_3Si and the two-gap superconductor $NbSe_2$. Both temperature and applied magnetic field strongly affect the electronic structure of the vortex cores in these type-II materials, which in turn affects the spatial extent of the cores themselves. Increasing temperature causes excitations of the localized quasiparticle core states, whereas increasing magnetic field results in a delocalization of the core states. The presence of two gaps at the Fermi surface in $NbSe_2$ leads to an unusually large core size at low magnetic fields, with the ratio of the low-field to high-field core sizes being approximately equal to the ratio of the magnitudes of the two energy gaps. We show that the measured behavior of the vortex core size in these materials is fully explained in terms of these effects, and a comparison to recent theoretical work is made.

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