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Fundamentals of free flux flow: proposed studies[1] J.A. ALEXANDER, O. GAFAROV, A.A. GAPUD, University of South Alabama, J.Z. WU, University of Kansas — Although much is known about free flux flow (FFF) in superconductors – in which pinning is insignificant compared to interactions between quantized vortices – there still remain questions concerning fundamental dynamics. Building on our previous work in correlating FFF with vortex core size (*PRB* **80**, 134524), we propose three new studies examining more deeply the normal state in the vortex core and interactions between vortices. A correlation between scattering inside cores and the viscosity of FFF has not been explicitly determined; this may be investigated by probing the effect of scattering centers created by proton irradiation. Using results of previous irradiation work, one could control the extent of normal state scattering while monitoring effects on FFF. Questions also exist concerning vortex motion in channels with widths approaching that of individual vortices – as determined solely by inter-vortex interactions. Studies have suggested that flux flow through constrictions could imitate "jamming" in the collective motion of *grains*: Under certain conditions, it is possible for grains to form a barrier, blocking flow. More than just qualitatively comparing flux flow and granular flow to find evidence of jamming, we propose a new experiment for quantitatively modeling flux jamming by realizing the flux flow equivalent of granular jamming in a "hopper". In the same way, we also propose a FFF equivalent of another granular-flow phenomenon, "non-Newtonian" fluids, where rapid shear causes jamming.

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