Abstract Submitted
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Type-1.5 superconductivity: effects of interband interactions and Semi-Meissner State[1] EGOR BABAEV, UMass Amherst and KTH Stockholm, JOHAN CARLSTROM, KTH Stockholm and UMass Amherst, JULIEN GARAUD, UMass Amherst — A conventional superconductor is described by a single complex order parameter field which has two fundamental length scales, the magnetic field penetration depth λ and the coherence length ξ. Their ratio κ determines the response of a superconductor to an external field, sorting them into two categories as follows; type-I when $\kappa < 1/\sqrt{2}$ and type-II when $\kappa > 1/\sqrt{2}$. Multicomponent systems can possess three or more fundamental length scales and allow a separate "type-1.5" superconducting state when $\xi_1 < \sqrt{2}\lambda < \xi_2$. In that state, as a consequence of the extra fundamental length scale vortices attract one another at long range but repel at shorter ranges. As a consequence the system should form an additional Semi-Meissner state. In that state vortices form clusters in low magnetic fields. In the vortex clusters the component with larger coherence length is depleted and consequently its current is mostly concentrated on the boundaries of the vortex cluster, thus resembling the screening currents in type-I superconductors. We discuss how the vortex clusters and type-1.5 regimes are affected by various interband couplings in multiband superconductors.

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