Unusial single and multi−fluxon properties of stacked Josephson junctions

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Fluxon (Josephson vortex) properties of stacked Josephson junctions (SJJ's) are considerably different from that of single Josephson junctions. Here I review anomalous single and multi−fluxon properties of SJJ's both in static and dynamic cases: (i) The shape of a moving fluxon may be very unusual, with inverted magnetic inductions in neighbor junctions. (ii) There is only partial or no Lorentz contraction of a moving fluxonin SJJ's. (iii) Fluxons can move with a velocity larger than the electromagnetic phase velocity. Such motion is accompanied by multi−mode Josephson plasma wave (Cherenkov) radiation. (iv) Multiple quasi−equilibrium fluxon modes exist in SJJ's, causing strong fluctuations and bifurcations in transport properties. The existence of multiple fluxon modes is in good agreement with experimental data for both high−Tc mesa structures and low−Tc multilayers and can explain multiple−valued critical current, absence of periodic Fraunhofer modulation of Josephson current and other unusual fluxon−related properties of SJJ's and layered superconductors.