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Josephson current in parallel SFS junctions PAVEL IOSELEVICH, PAVEL OSTROVSKY, Max Planck Institute for Solid State Research, Stuttgart, Germany, YAKOV FOMINOV, MIKHAIL FEIGELMAN, Landau Institute for Theoretical Physics — We study a Josephson junction between superconductors connected by two parallel ferromagnetic arms. If the ferromagnets are fully polarised, supercurrent can only flow via Cooper pair splitting between the differently polarised arms. The disorder-average current is suppressed, but mesoscopic fluctuations lead to a significant typical current. We extract the typical current from a current-current correlator. The current is proportional to $\sin^2 \alpha/2$, where α is the angle between the polarisations of the two arms, revealing the spin dependence of crossed Andreev reflection. Compared to an SNS device of the same geometry, the typical SFS current is small by a factor determined by the properties of the superconducting leads alone. The current is insensitive to the flux threading the area between the ferromagnetic arms of the junction. However, if the ferromagnetic arms are replaced by metal with magnetic impurities, or partially polarised ferromagnets, the Josephson current starts depending on the flux with a period of h/e, i.e. twice the superconducting flux quantum.

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