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Josephson Effect in Presence of Spin Berry Phase HIROSHI KOHNO, GEN TATARA, Osaka University, NAOTO NAGAOSA, Tokyo University, ALEXANDER BALATSKY, Los Alamos Natinoal Laboratory — Spin Berry phase is known to contribute to the phase coherent electronic transport in normal mecoscopic rings. Here we show that spin Berry phase can produce a persistent Josephson current as a result of the coupling between tunneling electrons and spins in the junctions. The simplest geometry where this effect is realized is a ring with three Josephson junctions with spins in each of them. Spin chirality $C_{123} = (S_1 \times S_2) \cdot S_3$ is shown to couple to superconducting current in a way, similar to the external magnetic field coupling. Effect is shown to be a result of the interference of the Cooper pair virtual tunneling across opposite arms of the ring and is decaying exponentially with the distance with the superconducting coherence length as a natural length scale. We discuss possible realization of this effect in a multilayered magnetic-superconducting structure.

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