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Poynting Robertson Battery and the Chiral Magnetic Fields of AGN Jets DEMOSTHENES KAZANAS, NASA/GSFC, IOANNIS CONTOPOULOS, Academy of Athens, Athens Greece, DIMITRIS CHRISTODOULOU, Math Mathods, Bedford MA, DENISE GABUZDA, University of Cork, Ireland — The origin of cosmicmagnetic (B) fields remains an open question. It is generally believed that very weak primordial B fields are amplified by dynamo processes, but it appears unlikely that the amplification proceeds fast enough to account for the fields presently observed in galaxies and galaxy clusters. In an alternative scenario, cosmic B fields are generated near the inner edges of accretion disks in active galactic nuclei (AGNs) by azimuthal electric currents due to the difference between the plasma electron and ion velocities that arises when the electrons are retarded by interactions with photons. While dynamo processes show no preference for the polarity of the (presumably random) seed field that they amplify, this alternative mechanism uniquely relates the polarity of the poloidal B field to the angular velocity of the accretion disk, resulting in a unique direction for the toroidal B field induced by disk rotation. Observations of the toroidal fields of 29 AGN jets revealed by parsec-scale Faraday rotation measurements show a clear asymmetry that is consistent with this model, with the probability that this asymmetry came about by chance being less than 1%. This lends support to the hypothesis that the universe is seeded by B fields that are generated in AGNs via this mechanism and subsequently injected into intergalactic space by the jet outflows.

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