

A topological analysis of the EM helix

Enzo Bonacci

(Liceo Scientifico Statale “G.B. Grassi”, Latina, Italy)

E-mail: enzo.bonacci@liceograssilatina.org

The recent proposal to detect Dark Matter through the Aharonov-Bohm effect [10] has renovated the interest for cosmological solutions based upon magnetic monopoles [8]. Challenging the Λ -CDM paradigm, some alternative representations are grounded on interactions with hypothetical magnetic charges [6] whereas others suppose the influence of relic magnetic atoms [4]. This raises two apparently separate issues about why magnetic monopoles have never been spotted and where those elusive particles come from. More than a decade ago ([1, 2, 3]) we described the materialization of mass from radiant energy as a process requiring the indistinguishability between the inertial reference frames at $v = c$ (SOL, i.e., speed of light) and those at $v < c$ (STL, i.e., slower than light). Such rigorous interpretation of the relativity principle could clarify the entanglement between temporally separated photons [7] and would allow the self-interacting electromagnetic rings, possible in SOL reference frames (characterized by atemporality), to be perceived as electromagnetic helices for STL observers. Namely, we assumed that a charged mass (both electric and magnetic) could be an electromagnetic helix, thus explaining some intrinsic quantities of particles and the absence of magnetic monopoles at low energies. Our model has been indirectly corroborated by the observation of the light self-torque [9] and could find future confirmation from a promising method to determine the geometry of an electron [5]. We wish to illustrate some topological questions behind a so formulated mathematical-physical theory, included a falsification test currently being assembled at CERN’s MoEDAL.

REFERENCES

- [1] Enzo Bonacci. *Absolute Relativity*. Turin : Carta e Penna, 2007.
- [2] Enzo Bonacci. *Extension of Einstein’s Relativity*, volume 42 of *Physical Sciences*. Rome : Aracne Editrice, 2007.
- [3] Enzo Bonacci. *Beyond Relativity*, volume 43 of *Physical Sciences*. Rome : Aracne Editrice, 2007.
- [4] Vladimir V. Burdyuzha. Magnetic Monopoles and Dark Matter. *Journal of Experimental and Theoretical Physics*, 127(4) : 638–646, 2018.
- [5] Leon C. Camenzind et al. Spectroscopy of Quantum Dot Orbitals with In-Plane Magnetic Fields. *Physical Review Letters*, 122(20) : 207701, 2019.
- [6] Valentin V. Khoze and Gunnar Ro. Dark matter monopoles, vectors and photons. *Journal of High Energy Physics*, 10(61), 2014.
- [7] Eli Megidish et al. Entanglement Swapping between Photons that have Never Coexisted. *Physical Review Letters*, 110(21) : 210403, 2013.
- [8] Arttu Rajantie. Magnetic Monopoles in Field Theory and Cosmology. *Philosophical Transactions of The Royal Society A Mathematical Physical and Engineering Sciences*, 370(1981) : 5705–5717, 2012.

- [9] Laura Rego et al. Generation of extreme-ultraviolet beams with time-varying orbital angular momentum. *Science*, 364(6447) : eaaw9486, 2019.
- [10] John Terning and Christopher B. Verhaaren. Detecting Dark Matter with Aharonov-Bohm. *Journal of High Energy Physics*, 12(152), 2019.