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Conserved currents for electromagnetic fields in the Kerr space-time ALEXANDER GRANT, EANNA FLANAGAN, Cornell University — For any classical linear Lagrangian field theory, the symplectic product provides a conserved current that is bilinear on the space of solutions. Given a linear mapping from the space of solutions into itself, a “symmetry operator”, one can therefore generate quadratic conserved currents for any linear classical field theory. We apply this procedure to the case of electromagnetism on a Kerr background, showing that this procedure can generate the conserved currents given by Andersson, Bäckdahl, and Blue, as well as two new conserved currents. These currents reduce to the sum of (positive powers of) the Carter constants of the photons in the geometric optics limit, and generalize the current for scalar fields discovered by Carter. We furthermore show that the fluxes of these new currents through null infinity and the horizon are finite.

Alexander Grant
Cornell University

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