

Title: Boundary conditions for Maxwell's equations on globally hyperbolic spacetimes with timelike boundary.

Abstract: We study Maxwell's equation as a theory for smooth k -forms on globally hyperbolic spacetimes with timelike boundary. In particular we start by investigating on these backgrounds the D'Alembert - de Rham wave operator and we highlight the boundary conditions which yield a Green's formula . Subsequently, we characterize the space of solutions of the associated initial and boundary value problem under the assumption that advanced and retarded Green operators do exist. This hypothesis is proven to be verified by a large class of boundary conditions using the method of boundary triples and under the additional assumption that the underlying spacetime is ultrastatic. Subsequently we focus on the Maxwell operator. First we construct the boundary conditions which entail a Green's formula for such operator and then we highlight two distinguished cases, dubbed d -tangential and d -normal boundary conditions. Associated to these we introduce two different notions of gauge equivalence and we prove that in both cases, every equivalence class admits a representative abiding to the Lorentz gauge. We comment on the consequences of these two options in the construction of the underlying algebra of observables. -- Joint work with Nicolò Drago (U. Würzburg) and Rubens Longhi (U. Potsdam), arXiv: 1908.09504 [math-ph], to appear in Ann. Henri Poincaré.