

Hadamard states for quantum Abelian duality

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Abstract Abelian duality extends to generalised Abelian gauge theories the usual electric/magnetic duality of source-free Maxwell theory. Quite remarkably, combining locally covariant quantum field theory with differential cohomology enables us to implement Abelian duality as a full-fledged natural isomorphism of quantum field theories. After a quick review of these aspects, we will focus on the construction of states for the relevant C^* -algebra of observables. Our goal is to show that Abelian duality is unitarily implemented on the GNS triple. This result is achieved by means of a C^* -algebraic factorization that disentangles the dynamical degrees of freedom of the theory from the topological ones, which encode the magnetic and electric fluxes carried by field configurations. With such factorization we obtain a duality-compatible state for the full theory by assigning one that fulfils the microlocal spectrum condition on the dynamical sector and one, that resembles a quantum mechanical system, on the topological sector. This leads to the sought-after unitary implementation of Abelian duality.

References:

- Benini, Capoferri, Dappiaggi - *Hadamard states for quantum Abelian duality*. arXiv:[[1611.10282](#)]
- Becker, Benini, Schenkel, Szabo - *Abelian duality on globally hyperbolic spacetimes*. arXiv:[[1511.00316](#)]
- Becker, Benini, Schenkel, Szabo - *Cheeger-Simons differential characters with compact support and Pontryagin duality*. arXiv:[[1511.00324](#)]