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# The ABJ anomaly as a U(1) symmetry and Noether's theorem

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Haag duality is a simple property of algebras attached to regions in QFT that expresses a form of completeness of the theory. Violations of Haag duality are due to "non-local operators". These may be charged with respect to global symmetries. When this happens for a continuous symmetry there is an obstruction for the validity of Noether's theorem. This is behind all known examples when the Noether current is absent, including the ones covered by Weinberg-Witten theorem. An abstract classification of the simplest possibilities is divided into two classes. In the first one there are non compact sectors, which leads to free models. The other possibility, allowing interacting models, corresponds to the ABJ anomaly. This interpretation unifies the features of the anomaly — anomaly matching, anomaly quantization, non-existence of the Noether current, and validity of Goldstone theorem — from a symmetry based perspective.

**Presenter:** CASINI, Horacio (Instituto Balseiro, Argentina)