

A constructional framework for BRST-related symmetries

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The famous Becchi-Rouet-Stora-Tyutin (BRST) symmetry has been around in general quantum field theories for the last fifty years. At first an important tool for renormalizability and unitarity checking, the BRST symmetry has also a pure algebraic appeal, being related to graded algebras, Hodge theory and cohomology. Actually, after the discovery of the original BRST transformations in the context of Yang-Mills theories, we have been witnessing the appearance of similar graded symmetries such as anti-BRST, co-BRST, dual-BRST as well as finite field dependent versions (FFBRST and related ones). In this talk, we start with an elementary mini review of standard BRST transformations in QED and introduce a fairly general prototypical gauge-invariant system (PGIS) in which many sorts of BRST-related symmetries are shown to be realizable. We take the opportunity to compare the different roles and interpretations of those similar transformations in the PGIS context. We clarify their dual nature related to the possibility of leaving invariant either the gauge-fixing, ghost parts or classical Lagrangian terms of the action. We use the PGIS as a means to generate brand-new unprecedented non-local BRST-related symmetries with possible applications to standard and novel field theory models.