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Gauge-invariant description of the Higgs resonance

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In this talk, I will discuss the phenomenological consequences of a strict gauge-invariant formulation of the Brout-Englert-Higgs mechanism. This requires a description of physical observables in terms of bound state structures. Although this seems to be at odds with the common treatment of electroweak particle physics at first glance, the properties of the bound states can be described in a perturbative fashion due to the Fröhlich-Morchio-Strocchi (FMS) framework. In particular a relation between the bound states and the elementary fields is obtained within $R\xi$ gauges such that the main quantitative properties of the conventional description reappear at leading order of the FMS expansion. However, slight deviations of off-shell properties can be caused by the internal bound state structure. Further, I will show that the FMS approach provides a gauge-invariant Higgs spectral function which is not plagued by positivity violations or unphysical thresholds.

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