# Electroweak spin-1 resonances in Composite Higgs models

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## Composite Higgs models

Modern Composite Higgs models are a promising solution to the Naturalness problem in the Higgs sector, adressing why the Higgs mass is much lighter than expected and explaining the mass hierarchy among the Standard Model (SM) fermions. In these models, the Higgs boson is not elementary but a composite particle with finite size $l_H = 1/m^* \sim 1/\text{TeV}$. Therefore, radiative corrections to the Higgs mass have a natural cut-off. Similarly to pions in QCD, the Higgs particle emerges as a composite state bound by a new strong force due to symmetry breaking at the confinement scale $m^*$.
These models consist of two sectors: an elementary sector, including SM fermions and gauge bosons, and a new strong sector, containing hyperquark fermions. The composite sector is initially invariant under the symmetry group $\mathcal{G}$, which is spontaneously broken to $\mathcal{H}$ yielding Goldstone bosons in the coset $\mathcal{G}/\mathcal{H}$. Gauge interactions with the elementary sector explicitly break $\mathcal{G}$ and turn the massless Goldstones into massive pseudo-Nambu-Goldstone-Bosons (pNGBs). Through interactions involving SM fermions, gauge bosons and hyperquark mass terms, the Higgs potential is dynamically generated, which then leads to electroweak (EW) symmetry breaking.

## Phenomenology of spin-1 resonances

In this talk, I will focus on the description of resonances with spin-1, that arise in the electroweak sector of Composite Higgs models. I'll explain how these resonances can be embedded into the pNGB Lagrangian using the Callan-Coleman-Wess-Zumino (CCWZ) formalism and the hidden symmetry approach. We'll explore the specific coset SU(5)/SO(5) to discuss the predicted particle content and their mass mixing with SM gauge bosons. This mixing allows for single production in Drell-Yan processes at the LHC. In the end, we'll briefly explore their rich phenomenology which is suitable to derive robust lower limits on the vector mass parameter.