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# Hunting for Discrete Goldstone Bosons

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Pseudo Goldstone Bosons (pGBs) arising from the spontaneous breaking of an exact discrete symmetry have non-zero scalar masses which are immune to quadratic corrections. This is at variance with non-linearly realized continuous symmetries, for which the masses of pGBs require an explicit breaking mechanism and enjoy no such protection. The resulting symmetry-protected masses and potentials offer promising physics avenues, both theoretically and in view of the blooming experimental search for ALPs and other BSM particles. We develop this theoretical setup using invariant theory and focusing on the so-called natural minima of the potential, which are independent of the specific ultraviolet completion of the theory. Typically, a subgroup of the discrete symmetry —which is otherwise non-linearly realized—remains explicit in the spectrum, i.e. realized "à la Wigner". This suggests tell-tale experimental signals: at least two degenerate scalars produced simultaneously, plus specific ratios of multi-scalar amplitudes. The examples of A4 and A5 as subgroups of SO(3) are explored in substantial detail and other cases of phenomenological interest are discussed.

**Authors:** GAVELA LEGAZPI, Belen (Universidad Autonoma de Madrid (ES)); ENGUITA-VILETA, Víctor (Universidad Autónoma de Madrid); QUILEZ LASANTA, Pablo (Deutsches Elektronen-Synchrotron (DE)); HOUTZ, Rachel (IPPP Durham)

**Presenter:** ENGUITA-VILETA, Víctor (Universidad Autónoma de Madrid)

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