



INVITATION

as part of the Particle Physics Seminar

to the talk by

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on

***“Gauge Theory Bootstrap:
Pion amplitudes and low energy parameters”***

Abstract:

We propose the Gauge Theory Bootstrap -- a method to compute the pion S-matrix that describes the low energy physics of the strong interaction and other similar gauge theories. Using this method, we compute pion scattering phase shifts for all partial waves with angular momentum $K \leq 3$ up to 2 GeV and calculate the low energy chiPT coefficients $L_{\{1,2,4,6\}}$. The method looks for the most general S-matrix that matches at low energy the tree level amplitudes of the non-linear sigma model and at high energy, QCD sum rules and form factors. This is a theoretical/numerical calculation that uses as only data the pion mass m_π , pion decay constant f_π and the QCD parameters $N_c = 3$, $N_f = 2$, m_q and α_s . All results are in reasonable agreement with experiment. In particular, we find the $\rho(770)$, $f_2(1270)$ and $\rho(1450)$ resonances and some initial indication of particle production near the resonances. The interplay between the UV gauge theory and chiral dynamics is an example of a general situation where we know the microscopic theory as well as the effective theory of long wavelength fluctuations but we want to solve the strongly coupled dynamics at intermediate energies. The bootstrap builds a bridge between the low and high energy by determining the consistent S-matrix that matches both and provides, in this case, a new direction to understand the strongly coupled physics of gauge theories.

References:

- [1] YH and Martin Kruczenski, Phys. Rev. Lett. 133, 19601 and Phys. Rev. D 110, 096001.
- [2] YH and Martin Kruczenski, arXiv: 2403.10772.

Time: Tuesday, 17 December 2024, 4:15 p.m.

Location: Erwin-Schrödinger Lecture Hall, 1090 Vienna, Boltzmannngasse 5, 5th floor

Join Zoom Meeting - Meeting ID: 933 4269 3866 Passcode: 185096

<https://univienne.zoom.us/j/93342693866?pwd=aUpTR0VJNUhJY2Q0ajdaKzI1YWVhQ09>

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