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## The phase of the electromagnetic form factor of the pion

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The electromagnetic form factor of the charged pion encodes relevant information in hadron dynamics. On the one hand, its phase is related (modulo isospin-breaking corrections) to the universal  $\pi\pi$   $P$ -wave phase shift, that appears in a variety of hadronic processes. On the other hand, it appears as an essential input to describe hadronic electromagnetic interactions when employing dispersive formalisms. Furthermore, it is relevant to extract information about vector meson resonances. In this work, we employ a dispersion relation for the modulus of the form factor that allows to reconstruct its phase from its modulus above the unitarity cut. The latter has been extensively measured to high precision at  $e^+e^-$  colliders in the region ranging from threshold up to 3 GeV.

The formalism allows a data-based approach to extract the phase from threshold up to 2.5 GeV, well beyond the inelastic threshold where standard dispersive approaches cannot be applied. In addition, we provide relevant results, including the charged radius, the spacelike behavior, the extraction of the  $P$ -wave  $\pi\pi$  phase shift, or the less known (isospin-breaking) isoscalar form factor.

Reference: <https://arxiv.org/abs/2403.07121>

### session

D. Hadron Decays

**Primary author:** SANCHEZ PUERTAS, Pablo (University of Granada)

**Co-author:** Prof. RUIZ ARRIOLA, Enrique (University of Granada)

**Presenter:** SANCHEZ PUERTAS, Pablo (University of Granada)

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