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Rare $K^+ \to \pi^+\ell^+\ell^-$ decays with physical mass light-quarks

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$K^+ \to \pi^+\ell^+\ell^-$ is a highly suppressed decay mode in the Standard Model, and is therefore expected to be sensitive to new physics. In this talk, we present the first lattice calculation of the long-distance electromagnetic form factor V at physical light-quark masses for this decay. Our calculation features an explicit GIM subtraction, with dynamical zMöbius quarks and Möbius domain-wall fermion sea-quarks. In order to improve upon the obtained result, we identify the particular challenges to overcome on the road towards a competitive physical-point lattice calculation and suggest routes forward.

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