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## The QCD chiral phase transition for different numbers of quark flavours

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The Columbia plot specifies the order of the  $N_f = 2 + 1$  QCD thermal transition as a function of the quark masses. Since massless quarks cannot be simulated directly, the nature of the phase transition in the limit of vanishing  $u, d$ -quark masses has remained elusive, with different discretisations showing different orders of the transition in the small mass regime. We propose a modified analysis in the parameter space of degenerate quark masses, variable number of flavours and lattice spacing. Using unimproved staggered fermions with  $N_f \in [2, 7]$  and  $N_\tau = 4, 6, 8$ , we map out regions of first-order transitions and crossover transitions, separated by a critical surface, in the bare parameter space of the lattice theory. This constrains the possibilities for an eventual continuum approach.

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