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The smallest bimolecular mass-action system with a vertical Andronov–Hopf bifurcation

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We present a three-dimensional differential equation, which robustly displays a degenerate Andronov–Hopf bifurcation of infinite codimension, leading to a center, i.e., an invariant two-dimensional surface that is filled with periodic orbits surrounding an equilibrium. The system arises from a three-species bimolecular chemical reaction network consisting of four reactions. In fact, it is, up to a natural equivalence, the only such mass-action system that admits a center via an Andronov–Hopf bifurcation.

The talk is based on a recent joint paper with Murad Banaji and Boros Balázs:

<https://www.sciencedirect.com/science/article/pii/S0893965923001039>