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Charge-breaking opportunities for the early Universe

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The hot early Universe must have evolved through phase transitions around the electroweak epoch. In multi-Higgs models, this evolution could be much more intricate than a single-step EWPT. In this talk, I will discuss a peculiar regime in the two-Higgs-doublet model, in which thermal evolution of the early Universe passes through an intermediate phase with a charge-breaking vacuum. Remarkably, this regime is realized in a specific part of the parameter space that can be tested at colliders. I will also argue that multi-Higgs-doublet models allow for a different type of phase transitions, with two neutral minima separated by a charge-breaking bubble wall. This intriguing evolution scenario remains largely unexplored.

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