Converse symmetry breaking in network dynamics

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An increasing number of systems is now known to exhibit a symmetry effect that we refer to as converse symmetry breaking (CSB). It concerns scenarios where the stabilization of a symmetric state of interest requires explicitly breaking the given symmetry in the system itself. In this presentation, I will discuss recent advances in the mathematical, computational, and experimental study of this effect in the synchronization of coupled oscillators. In this case, CSB describes situations where stable synchronization requires the oscillators to be nonidentical, nonidentically coupled, or nonidentically driven. Examples will be given for networks of optoelectronic, electromechanical, and electrochemical entities as well as power generators and chaotic circuits, among others. It follows that parameter mismatches, which are ubiquitous and often unavoidable in real systems, can serve as a source of stability.