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Sommario/riassunto	Stochastic fluctuations are intrinsic to and unavoidable at every stage of neural dynamics. For example, ion channels undergo random conformational changes, neurotransmitter release at synapses is discrete and probabilistic, and neural networks are embedded in spontaneous background activity. The mathematical and computational tool sets contributing to our understanding of stochastic neural dynamics have expanded rapidly in recent years. New theories have emerged detailing the dynamics and computational power of the balanced state in recurrent networks. At the cellular level, novel stochastic extensions to the classical Hodgkin-Huxley model have enlarged our understanding of neuronal dynamics and action potential initiation. Analytical methods have been developed that allow for the calculation of the firing statistics of simplified phenomenological integrate-and-fire models, taking into account adaptation currents or temporal correlations of the noise. This Research Topic is focused on identified physiological/internal noise sources and mechanisms. By "internal", we mean variability that is generated by intrinsic biophysical processes. This includes noise at a range of scales, from ion channels to synapses to neurons to networks. The contributions in this Research Topic introduce innovative mathematical analysis and/or computational methods that relate to empirical measures of neural activity and illuminate the functional role of intrinsic noise in the brain.