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Magnetic Reconnection under Extreme Astrophysical Plasma Conditions[1] DMITRI UZDENSKY, JOHN MEHLHAFF, GREGORY WERNER, University of Colorado, Boulder, MITCHELL BEGELMAN, JILA and University of Colorado, Boulder — Magnetic reconnection is a key fundamental plasma-physical process operating in many astrophysical systems and responsible for sudden and often violent release of accumulated magnetic energy, powering spectacular X-ray and gamma-ray flares. In many of the most enigmatic relativistic high-energy astrophysical systems (those associated with neutron stars and black holes) the plasma conditions are so extreme that exotic physics effects — e.g., strong interaction of plasma with radiation and QED processes such as pair creation — need to be included self-consistently in the plasma description. These effects modify reconnection dynamics, energetics, nonthermal particle acceleration, and observable radiative signatures. They thus necessitate the exploration of a new frontier in plasma astrophysics — radiative magnetic reconnection. In this talk I will present a systematic overview of extreme radiative magnetic reconnection, with a focus on an orderly classification of the different physical parameter regimes. I will also discuss astrophysical applications of radiative reconnection with concrete examples drawn from modern high-energy astrophysics research.
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