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Integrated Radio Emission Models

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Much work has gone into understand the various physical processes thatunderlie solar system radio emissions: energy sources, wave emission and conversion processes, scattering and propagation, and source geometry. Theoretical and computational advances now enable these stages to be integrated into realistic, semiquntitative models whose predictions can be compared in detail with spacecraft and ground-based data on plasma and particle properties, in situ waves, and radio emissions. This talk (i) provides an overview of this integration stage, (ii) outlines how new or improved theories of specific subprocesses can be assessed within the overall framework, rather than in isolation, (iii) highlights pitfalls and common misconceptions regarding what constitutes a favorable emission mechanism and/or energy-conversion process, (iv) and reviews how integated models can be assessed against data. Specific illustrations are provided using our recent theories of beam-driven Langmuir waves and resulting observable solar and planetary radio emissions.