Validating electromagnetic turbulence and transport effects for burning plasmas

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Electromagnetic effects on transport are emerging as increasingly important for all toroidal confinement devices at finite beta. Understanding turbulence and transport dependence on beta, aspect ratio, and collisionality will play an important role in optimizing FNSF, pilot plants, and next generation devices, and may also be important for advanced ITER operating scenarios. The importance of electromagnetic effects has been predicted for numerous toroidal confinement devices and radial locations (pedestal and core) including: kinetic and resistive ballooning modes, micro-tearing modes, global and compressional Alfven eigenmodes, and electromagnetic versions of the ion-temperature gradient mode to name a few. However, present measurements and theory/computation tools are insufficient to broadly measure and predict electromagnetic effects, and lag behind our present understanding of electrostatic transport. Initiatives in diagnostic and theory/computational development to measure and model electromagnetic effects in turbulent transport will be described.