Energetic Particle Physics in ITER Plasmas

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Burning plasma experiments on ITER will have a large population of energetic fusion alphas, as well as fast ions from auxiliary heating and runaway electrons. Such super-Alfvenic particles can resonantly destabilize many MHD instabilities, including a whole family of Alfven eigenmodes and other energetic particle modes. These instabilities will affect alpha particle transport, and therefore plasma heating as well as first wall heat loads. Thus energetic particle physics is critical from both a physics and engineering point of view.

This project will review the effects of energetic particles on stability and confinement, and the resulting limits on ITER design and performance. Current understanding of linear and nonlinear stability, 3D field effects, and interaction with other MHD phenomena will be discussed. Main areas of focus are:

- 1. Basic theory of energetic particle modes and their effect on stability and confinement
- 2. Experiments from current tokamaks
- 3. Plans for the study of energetic particle physics on ITER

References

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