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Prospects for Advanced Tokamak Scenarios of High Performance Tokamak Regimes[1] A.D. TURNBULL, T.S. TAYLOR, J.R. FERRON, R.J. LA HAYE, Y.R. LIN-LIU, R.L. MILLER, E.J. STRAIT, M.S. CHU, C.M. GREENFIELD, L.L. LAO, GA, B.W. RICE, LLNL, E.A. LAZARUS, ORNL — For the Advanced Tokamak (AT) the requirement of good confinement and high β leads naturally to large pressure gradients associated with transport barriers. If good bootstrap current alignment is also required, the large current density and pressure gradient result in a fundamental conflict with MHD stability at high β. Physics solutions for the envisaged improvements in β have been identified, including second stability, wall stabilization and improved field line geometry, and in confinement through E×B shear stabilization of microinstabilities. Several regimes based on these physics solutions have been proposed: High β_p, High ℓ_i, and NCS configurations, various conventional improved confinement sceanrios such as H– and VH–mode, and Low Aspect Ratio geometries. A comparison of these proposed solutions for self consistently acheiving all three AT goals simultaneously, is given and the present experimental challenges, and proposed solutions are discussed.

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