NCSX Edge Modeling with PIES

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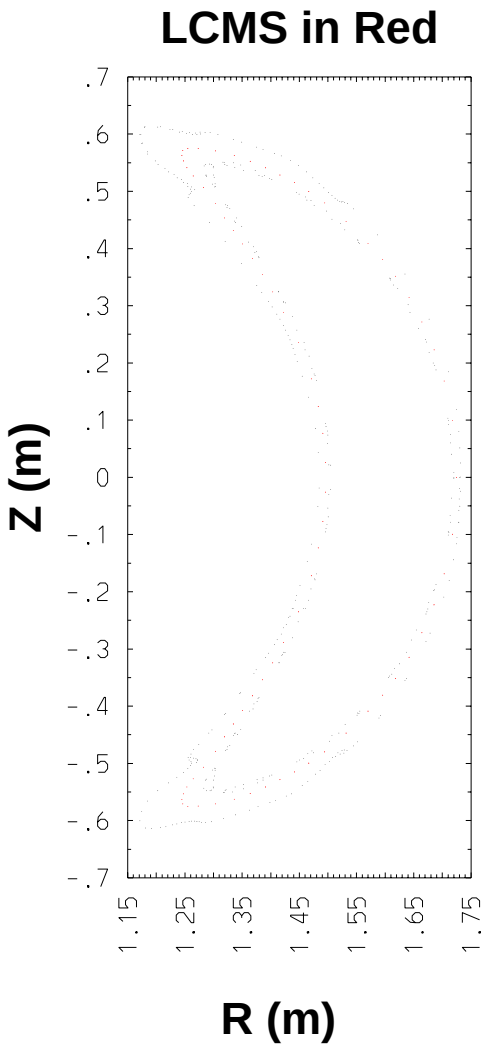
LCMS is Determined Visually from Poincare Surface-of-Section

3 surfaces-of-section with starting points at:

$$(R_0 , Z_0 , \Phi_0) = \begin{cases} (1.720, 0, 0) & \text{not smooth} \\ (1.725, 0, 0) & \text{LCMS (red)} \\ (1.730, 0, 0) & \text{internal islands} \end{cases}$$

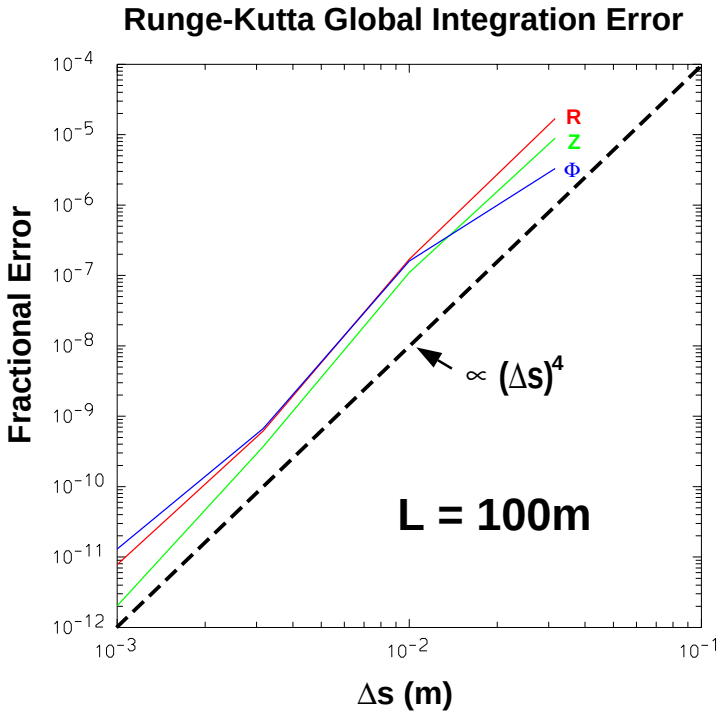


Global Integration Error Scales as L $(\Delta s)^4$

4th-order Runge-Kutta Integrator

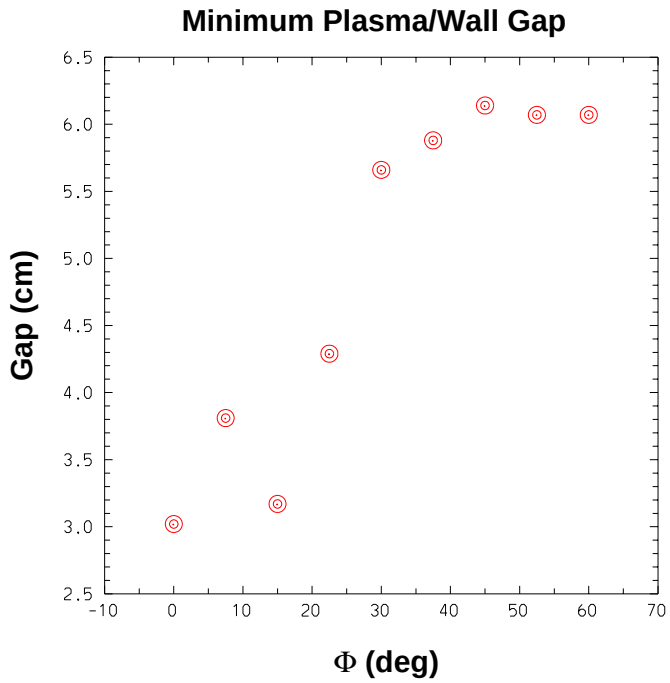
Integration error determined by forward/backward integration (*e.g.*, 100m on LCMS)

$\varepsilon \propto N(\Delta s)^5 = (N\,\Delta s)(\Delta s)^4 = L(\Delta s)^4$

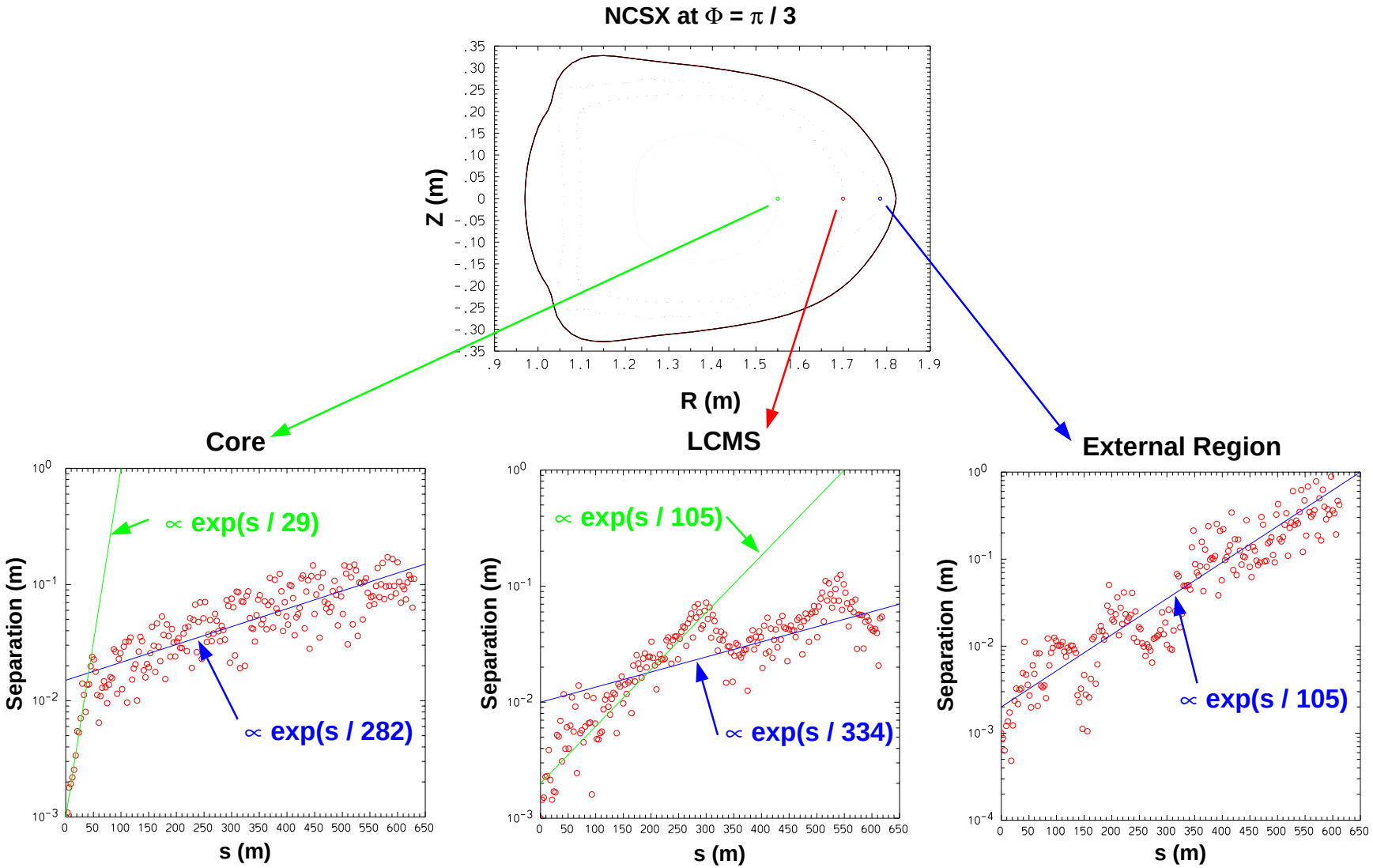


Plasma/Wall Gap is a Smooth Function of Φ

Minimum distance from LCMS to wall varies smoothly from 3 to 6 cm as Φ varies from 0 to 60^{o}

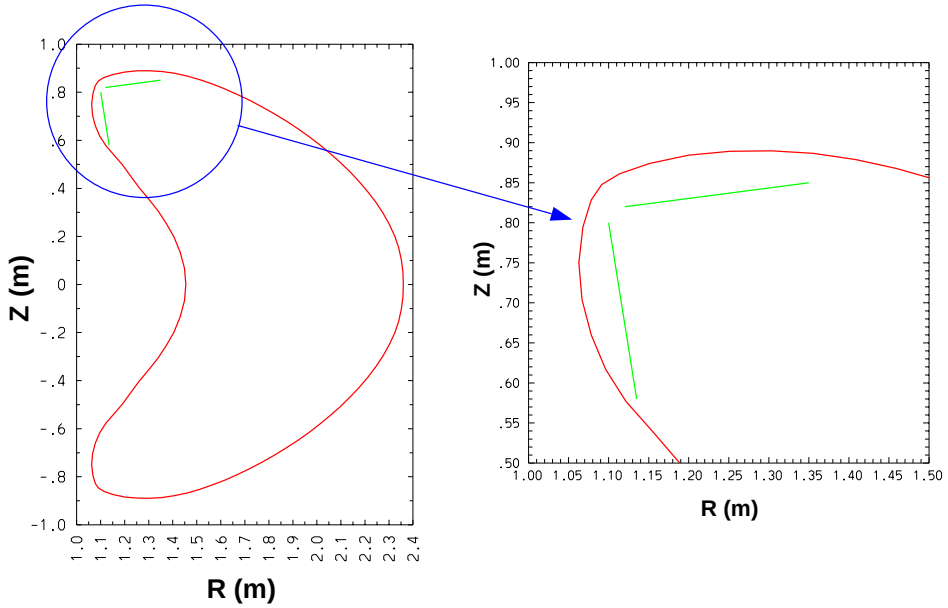


Rate of Field-Line Separation Depends on Starting Position



Work in Progress

- **Divertor Modeling**



- **Benchmarking wall heat-load determination:**
  - **Field-line tracing with trajectory diffusion**
  - **3D finite-difference solution of electron energy transport equation (McTaggart, Zagorski, *et al*, PSI 16)**