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EMC3-EIRENE 3D fluid SOL code package

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ISM remote meeting
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EMC3-EIRENE code package

- 3D fluid SOL code package.
- Solves reduced set of stationary single fluid Braginskii equations (n, $v_{\parallel}$, T_e, T_i, particle and heat fluxes on target) in 3D with a Lagrangian (Monte Carlo) Algorithm.
- Coupled to kinetic neutral Monte Carlo Code EIRENE to calculate sources due to plasma-neutral interactions.
- Simplified (non inertia) fluid Impurity model for n_{imp}, $v_{\parallel imp}$(by force balance), $T_{imp} = T_i$.
- 3D stochastic magnetic fields (RMP) possible.
- Simulations up to the wall (far SOL) possible.
- Investigation of 3D effects like RMP, ripple or toroidally localized gas puffing.
- Fully parallelized

Applications of EMC3-EIRENE

Stellarator

- **W7-AS** and **W7-X**
- **LHD** (without divertor region)

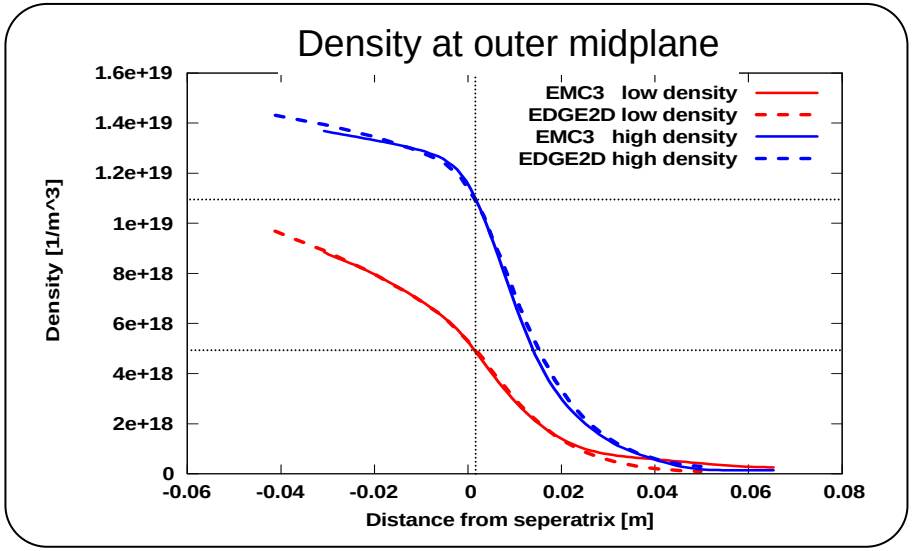
Tokamak (non divertor configuration)

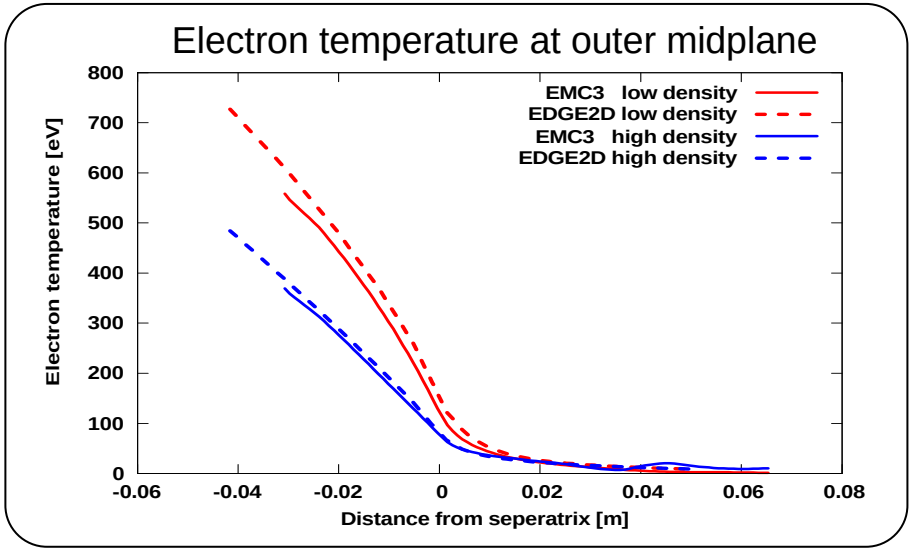
- **TEXTOR-DED**
- **ITER** (start-up limiter)

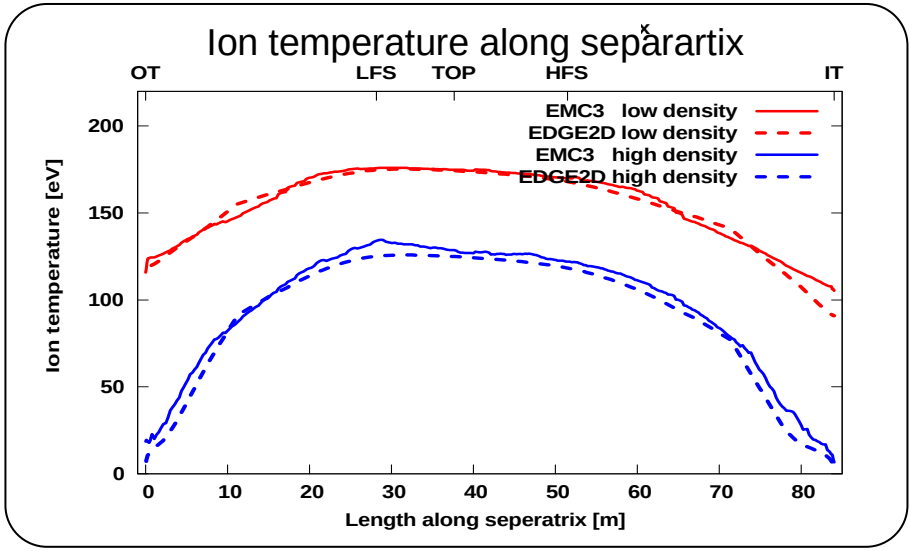
Tokamak (divertor configuration)

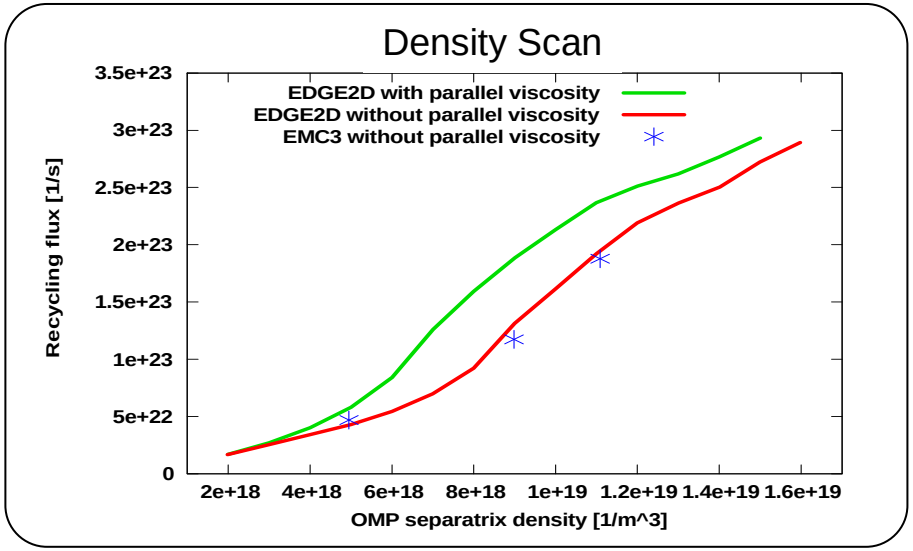
- **DIII-D** (implementation of divertor geometry)
- **JET** (2D benchmark with EDGE2D-EIRENE)
- **ITER** (ELM control by in-vessel coils, low density, ongoing… F4E project number: F4E-GRT-055 (PMS-PE))

EMC3-EDGE2D benchmark for JET









See: "Validating the 3D edge code EMC3-EIRENE against 2D simulations with EDGE2D-EIRENE for JET single null configurations", D.Harting et al., J. Nucl. Mater. (2011), doi:10.1016/j.jnucmat.2011.01.030, in press.

ISM Task: EMC3-EIRENE simulations for ITER baseline scenario

Required input:

- G-eqdsk equilibrium file.
- Wall geometry (R-,Z-coordinates).
- Boundary conditions (P_{in}, n_{sep}, $D_{\perp}$, $\chi_{\perp}$, $\lambda_{n,T}$).

Work for ITER baseline scenario

- Generate 3D field aligned grid for baseline scenario.
- Optimization of grid at target plates.
- Setup high density case for ITER and reach semi-detached regime.
  - *Implementation of volume recombination in cooperation with Jülich needed.*