Computational plasma dynamics: electromagnetic turbulence at 1 million kelvin

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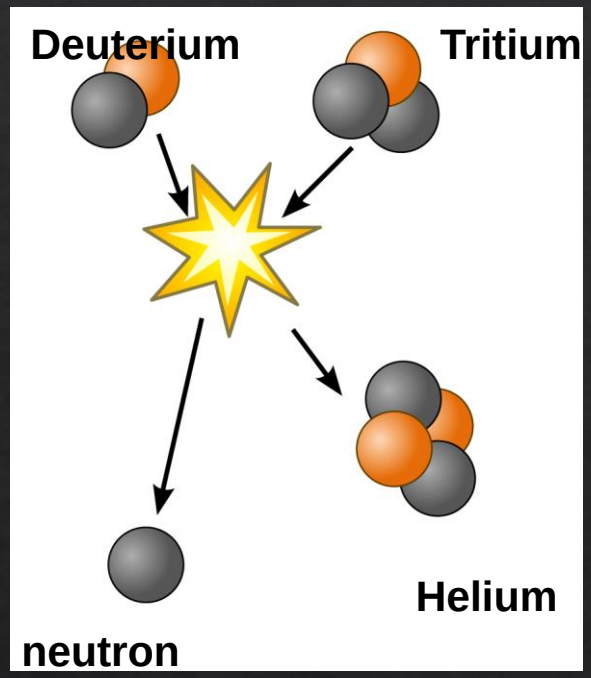
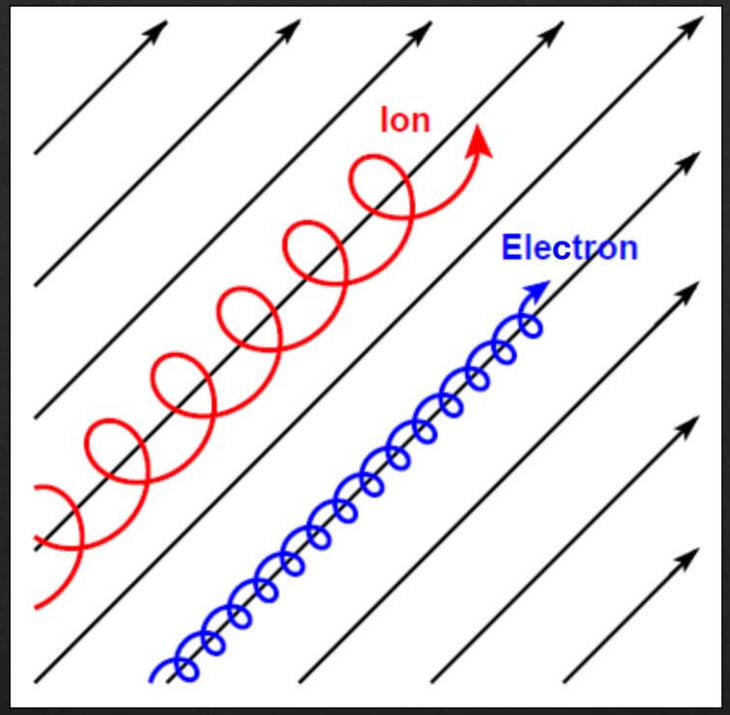


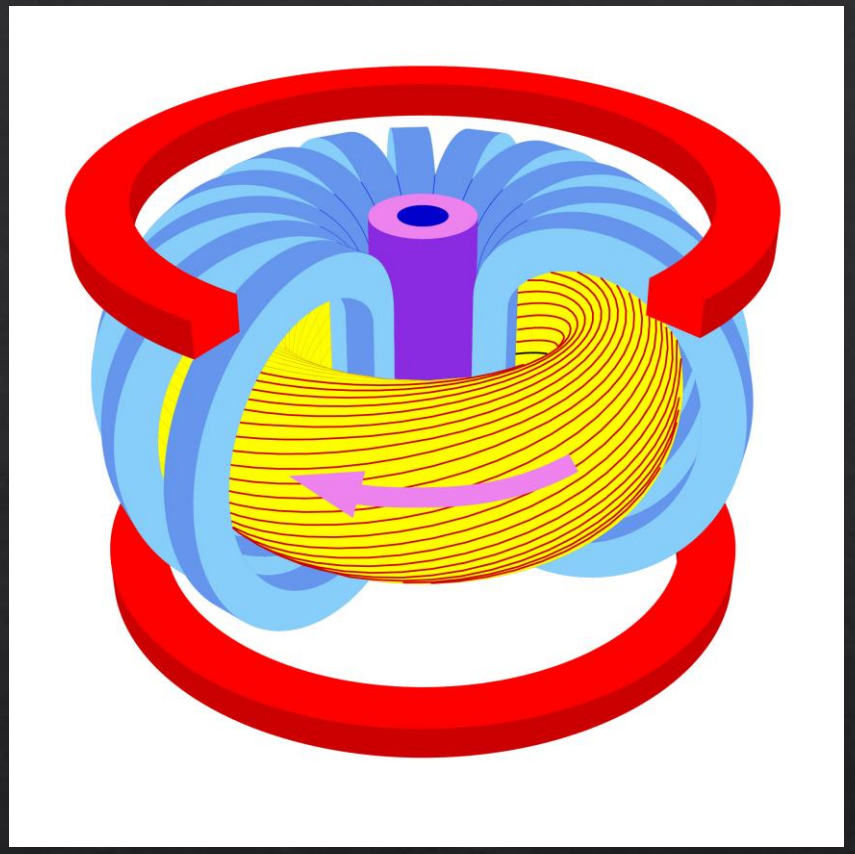
The nuclei are positively charged. For fusion they have to:

- overcome their electrostatic repulsion ⇒ 100 million ° C
- interact frequently

  ⇒ confinement necessary



- **Lorentz force** can provide magnetic confinement



Magnetic field of a tokamak is produced by:

- superconducting magnet coils
- inductive plasma current

⇒ pulsed operation

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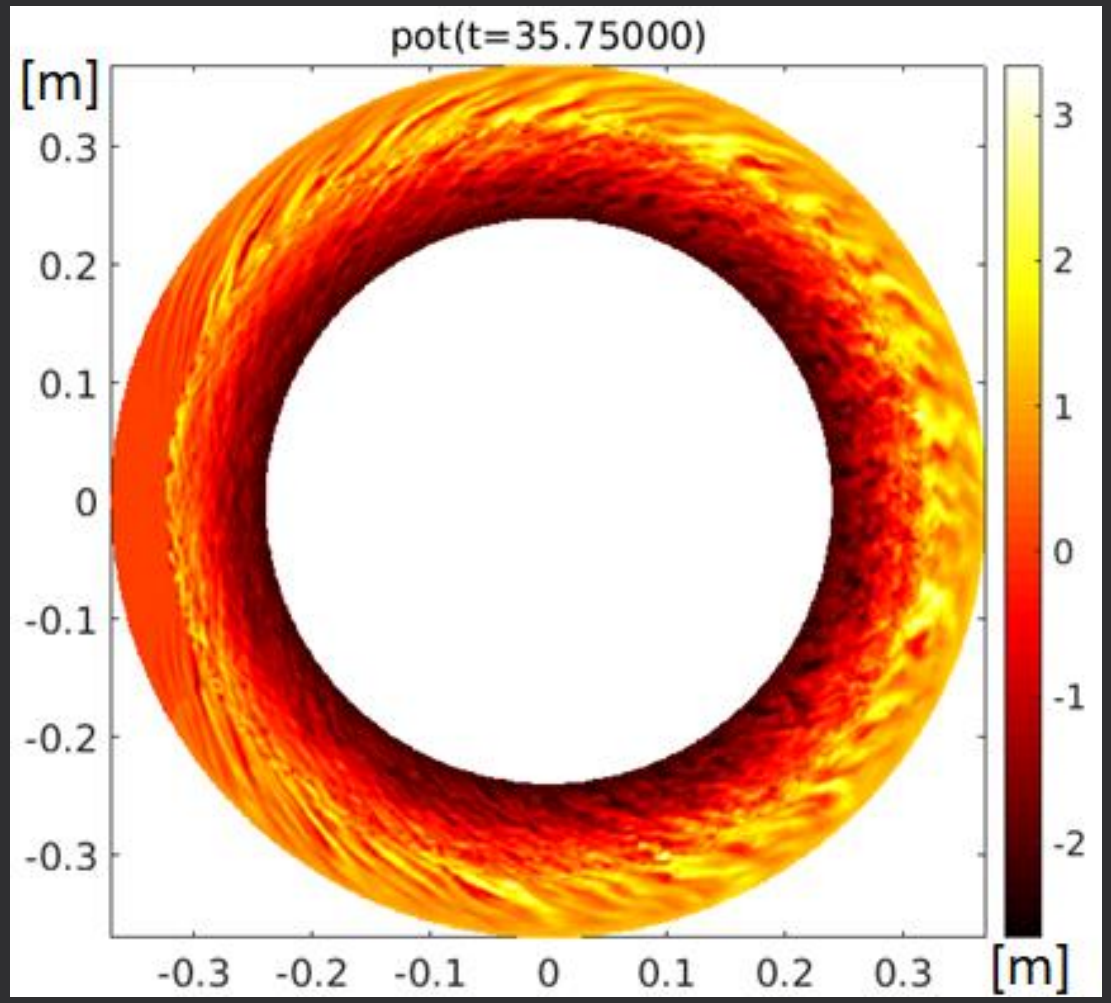
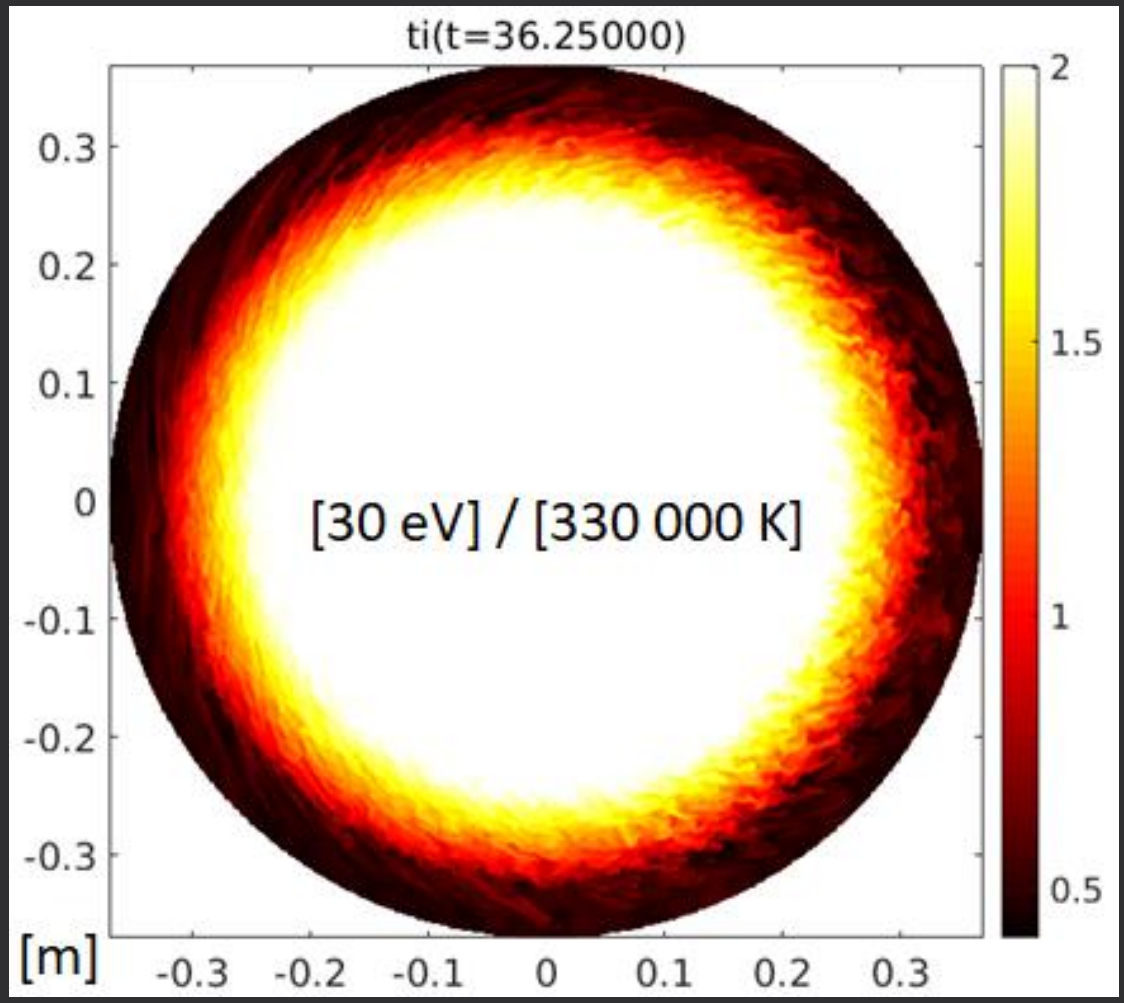
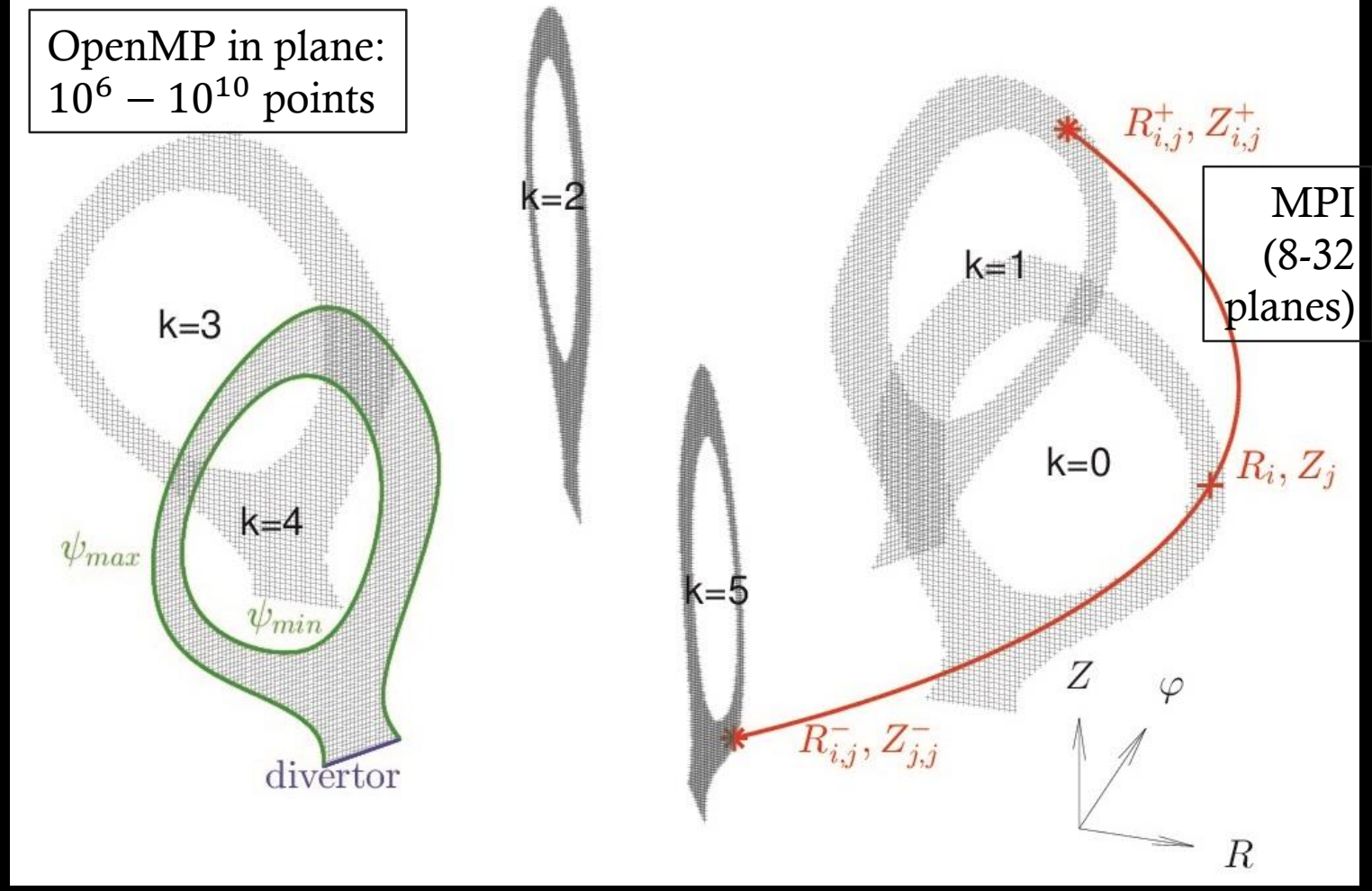


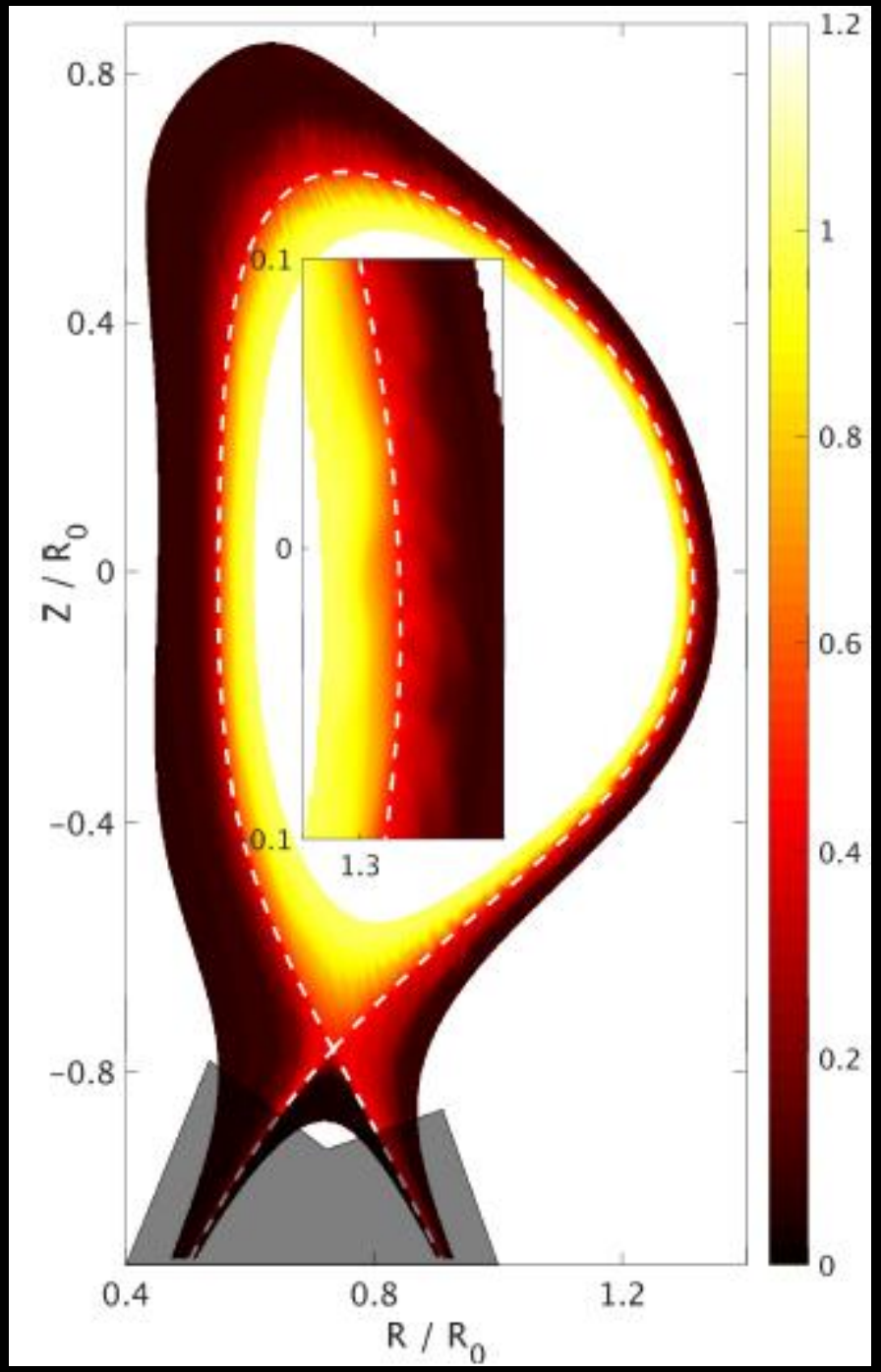


Focus on realistic magnetic geometry

OpenMP in plane:
$10^6 - 10^{10}$ points

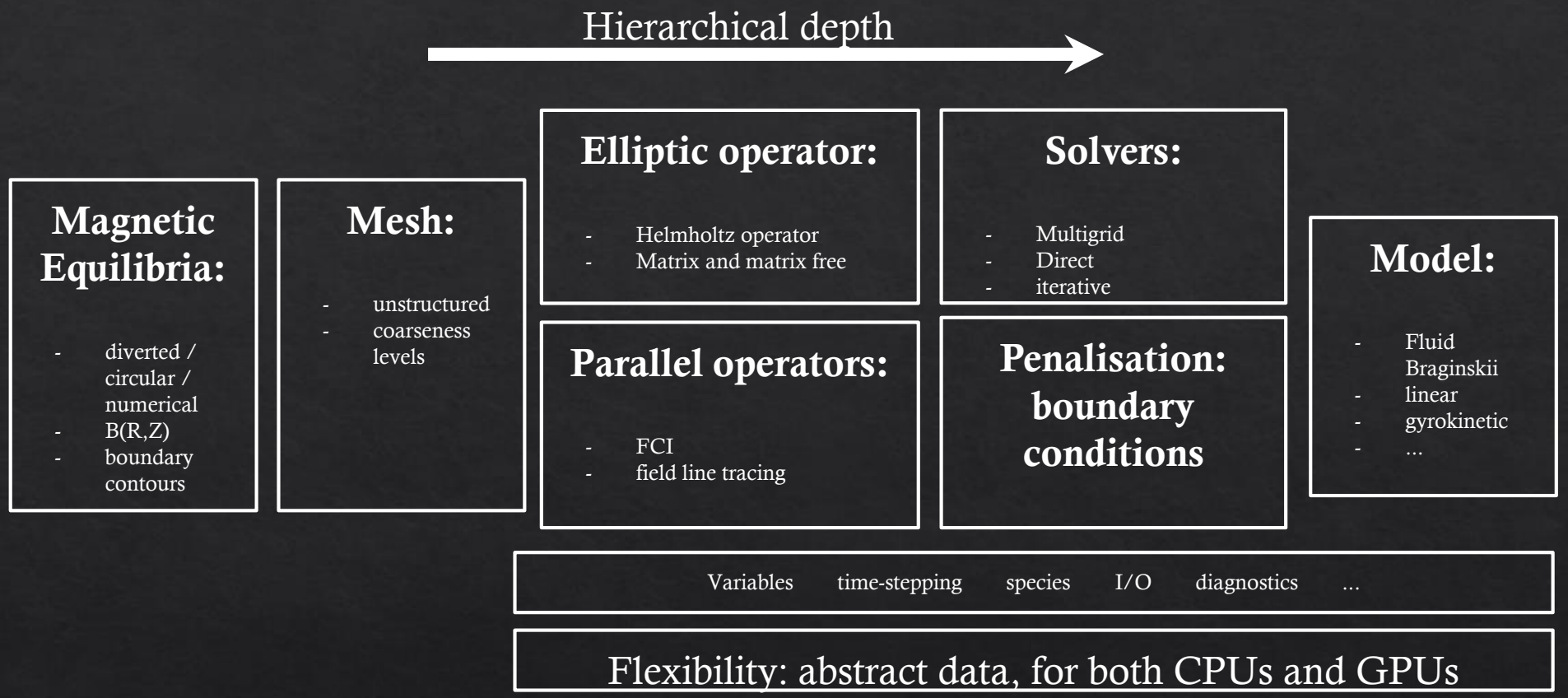


MPI
(8-32
planes)



Outlook: 3D MPI domain decomposition or 1D MPI + in-plane GPU?

Objects in GRILLIX & performance



Curretly: 10^{6-7} points on 32x24 cores in 1-12 month

Goal: 10^{6-11} points on any amount of cores in 1-12 weeks