Two-fold verification framework for gyrokinetic codes

IPP | Max-Planck-Institut für Plasmaphysik

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- **European project VeriGyro on verification of GK codes:**
  - Most popular tools for plasma turbulence investigation
  - Decades of delay between numerical and theoretical development
  - Variety of implemented GK models and numerical schemes:

    Eulerian, PIC, Semi-Lagrangian

- **Gyrokinetic models implemented into the codes**
  (task leader N.Tronko):
  - Systematic derivation from the Variational GK framework

- **Intercode Benchmark: implicit numerical schemes verification**

  (task leader T.Goerler; contributors N.Tronko, W.Hornsby, R.Kleiber, V.Grandgirard)

- **GENE/GKW** (Eulerian); **ORB5/EUTERPE** (PIC); **GYSELA** (Semi- Lagrangian)

Variational formulation of Gyrokinetics for codes

- **Poster focus: GENE and ORB5 codes verification**

- **Theory:** systematic derivation from action functional
  - Comparison of reduced particle models

- **Numerics:** Inter-code benchmark
  - Solvers and Models differences identification

- Linear electromagnetic β-scan: fitting low/high frequencies instabilities threshold

- Differences between GK Poisson equations solvers: Radial profiles