Nonlinear electromagnetic stabilization of ITG microturbulence by ICRF-driven fast ions in ASDEX Upgrade

Presenter: Felipe Nathan de Oliveira, BSC.

In collaboration with EUROfusion

Fusion as endless energy source.

www.iter.org

www.ipp.mpg.de
Motivation

- Fast ions produced by radio frequency heating and fusion reactions.
- Fast ion interaction with plasma and micro-turbulence $\rightarrow$ Complex physics behaviour.
- Complex dynamics $\rightarrow$ HPC.

**GENE: Gyrokinetic Electromagnetic Numerical Experiment.**

- Open source micro-turbulence code.
- Part of the "Unified European Application Benchmark Suite" by PRACE.
- Hybrid MPI/OpenMP
- Scalability up to 250K processors

Present work resources usage:
$\approx 0.5 \text{ MCPUh} \rightarrow 57 \text{ years}$

HPC facilities used:
MareNostrum (Spain)
Marconi-Fusion (EUROfusion, Italy)
Helios (Japan)

www.genecode.org
GENE linear analysis result:
Fast ions are pertinent in the stabilization of instability growth rate.

Discharge 31563
Discharge 31562
Reference discharge
Heat flux analysis

Non-linear simulations performed.

Simulation in good agreement with the experimental heat flux.

Following steps: isolate the impact of fast ions.
Thank you!

For further information, please visit my poster or email me

felipe.deoliveira@bsc.es