

# TSVV 10 update and needs

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# Mitigation of ICRH AE losses using NBI in ASDEX

- WPTE RT10 ; M12 proposal: AE Control NBI
- Counter ECCD with TAEs unstable for the whole discharge flattop
- <4 MW ICRF and <5 MW NBI; FILD, ICE, MSE
- Monitor EP distribution function (FILD, ICE, NPA, FIDA)

## EXPERIMENT

## MODELING

- ICRH distribution function modeling (EPFL)
- NBI distribution function modeling (Rabbit)
- LIGKA/ORB5/MEGA simulations of AEs using numerical EP distribution functions

# Studies of energetic 3He ions in 3-ion ICRF

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## EXPERIMENT

- WPTe RT10 ; M12 proposal: energetic 3He
  - CX measurements of energetic 3He
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## MODELING

- 3He distribution function modeling (EPFL Scenic)
  - 3-ion ORB5 simulations
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# Impact of 3He EP and AEs on plasma transport

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## EXPERIMENT

- WPTe RT10 ; M12 proposal: AUG 3-ion on-axis
  - Study discharges with strong electron heating (by 3He EP)
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## MODELING

- ETS-LIGKA/critical-gradient modeling using NAT AUG-benchmark parameters
  - ETS-LIGKA/critical-gradient modeling using ASDEX-U 3He (?)
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# Effect of neoclassical tearing modes on NBI fast ions

- WPTe RT11 ; M12 proposal: NTM FI

## EXPERIMENT

- Create low density plasmas with large (3,2) or (2,1) NTMs, at the same time optimised for fast-ion measurements in the plasma core
- Observe and document the NTM-induced transport of fast-ions in real- and velocity-space: ASDEX-Upgrade (NBI, ICRH, ECRH); 6 pulses

## MODELING

- ORB5: gyrokinetic Alfvén Eigenmodes in presence of static island
- ORB5: tearing mode evolution (simplified geometry); in presence of fast ions
- Similar problems in W7-X (MHD modes in presence of islands)

# EP confinement in tokamaks with external 3D fields

- WPTe RT11 ; M12 proposal: EP RMP control

## EXPERIMENT

- Measure EP losses in presence of RMP (single-particle motion): FILD, FIDA
- Evaluate scaling of the losses with RMP amplitude

## MODELING

- Effect on self-consistent (AE) fields?
- ORB5: use antenna to model RMP
- ORB5: AEs and EP transport with antenna-RMP

# AE control in tokamak by shaping

- WPTe RT11 ; M12 proposal: AE control shaping
- Measure AEs in TSVV varying upper and lower triangularity
- Measure EP confinement in TCV varying upper and lower triangularity

## EXPERIMENT

## MODELING

- ORB5: TCV AE-EP simulations for varying shaping

# EP physics in stellarators

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## EXPERIMENT

- W7-X: ICRH/NBI (power not enough for strong EP); AEs driven by bulk plasma
  - TJ-II: more NBI power, interesting results (chirping in heavy-ion probe)
  - HELIAS: several versions of conceptual design, issues with equilibrium quality
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## MODELING

- For W7-X: better ICHR or ICRH+NBI distribution functions required (SCENIC)
  - TJ-II: CKA-EUTERPE simulations of chirping events running
  - HELIAS: CKA-EUTERPE simulations of AEs and EPs planned
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# EP physics in JET, JT60-SA, ITER

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## EXPERIMENT

- JET: DT campaign ongoing
  - JT60-SA: assembly
  - ITER: assembly
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## MODELING

- JET: calculations for after-glow experiments possible
  - JT60-SA: LIGKA calculations; ORB5?
  - ITER: work within EP ITPA (LIGKA, ORB5)
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