

# Session 2 summary

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- Steve Zinkle: Materials Science & Technology Research
  - Summary of FESAC subcommittee report
  - Development paths for structural materials, blankets, PFCs
  - Committee adopted a “frontrunner” approach to speed development
  - Structural: reduced activation steels, blanket: PbLi, PFC: tungsten
  - Critical facility needs: fast neutron source, Blanket/thermofluid mechanics, long-pulse PMI facility
- Chuck Kessel: The FNSF and PMI/PFC development
  - FNSF to provide fully integrated reactor environment
  - Must function, maintain as a power plant
  - Exact design is still in flux: neutron fluence,  $P_{\text{fusion}}$  &  $Q_{\text{eng}}$  varies among candidate designs
    - Settling on ~2 week pulse, ~30% duty factor. What will limit pulse length?
  - Needs: long-pulse PMI, enhanced performance regimes, particle control, plasma control
- Guy Matthews: Jet operation with all-metal ITER-like wall
  - Carbon impurity reduced by 10x or more
  - No glow, low-Z coatings (post-disruption breakdown good)
  - Long term D retention ~10x lower than with carbon
  - Tungsten sputtering: outer divertor, impurity-dominated, mostly a problem during RF heating
  - W disruptions: slower quench, longer; larger halo current

# Session 2 summary (2)

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- Rick Kurtz: MASCO summary
  - Current budget: \$5,000k. Irradiation exps, T&M largest components; then He effects, fab&join, mech, alloys
  - Nanofabrication with  $Y_2Ti_2O_7$  inclusions can provide recombination, trapping of He inst. of at grain boundaries
    - May enhance T retention
  - Joining tests: successful demo of ODS-RAF weld
  - Success at modeling ductility loss in steels
- Bob Odette et al: Summary of Santa Barbara W workshop
  - Most important: get the CD from Bob
  - Forget monolithic tungsten
    - But it seems to work in monoblock designs
  - Possible use of copper as joining material
  - Fabrication avenue: powder metallurgy
    - Others: spark sintering, electrochemical
    - Recrystallization temp. an issue (800 C)
    - Laminated composites possible approach to ductility
- Dennis Whyte: PSI center research
  - Skimmer probe dev. for sheath pot., sputtering analysis
  - $\gamma \sim 8$  ok for sheath transmission coefficient at strikepoint
  - Li implantation developed for depth-marking
  - Prompt redeposition does not mitigate high-Z erosion
  - Don't know much about erosion-redep. (PISCES exps.)
  - Yes, W fuzz does grow in a tokamak
    - C-mod, in all-helium discharges