

Technical Program

Experimental Devices

FPL-3: JT-60SA Construction and Research Directions 1

William Spears, Fusion for Energy

ThPO-1: NSTX-U Vacuum Vessel Design Modification 9

Neway Atnafu, PPPL

ThPO-2: THE INVESTIGATION PROGRAMME OF PLASMA DISCHARGE ON HL-2A TOKAMAK 13

Xiao SONG, Southwestern Institute of Physics(SWIP)

ThPO-3: Physics of Cfetr 17

Baonian Wan, Institute of Plasma Physics, Chinese Academy of Sciences

ThPO-4: Investigation of Field Null for HL-2M Tokamak Start Up 23

Jian Liu, Southwestern Institute of Physics

ThPO-5: The ST25 Tokamak for Rapid Technological Development 27

Alan Sykes, Tokamak Solutions UK

FO1-3: Real Time Control of Plasma Performance on ASDEX Upgrade and Its Implications for ITER 31

Wolfgang Treutterer, Max-Planck Institute for Plasma Physics, Garching, Germany

TO1-4: East Accomplishments/Plans in Support of Fusion Next-Steps 38

yuntao song, institute of plasma physics, Chinese academy of sciences

TO1-2: MAST Accomplishments/Plans in Support of Fusion Next-Steps 44

William Morris, EURATOM/CCFE Fusion Association

FO1-1: LHD Accomplishments/plans in Support of Fusion Next-Steps 52

Shinsaku Imagawa, National Institute for Fusion Science

ThPO-8: Equilibrium Features of Bean-Shaped Spherical Tokamak Plasmas with an Ergodic Limiter 60

Celso Ribeiro, Instituto Tecnológico de Costa Rica

TO1-3: MAST UPGRADE - PROGRESS AND ENGINEERING CHALLENGES 63

Joseph Milnes, CCFE

ThPO-9: Engineering Issues to the Stellarator of Costa Rica 1 (SCR-1) 69

Ivan Vargas, Costa Rica Institute of Technology

TO1-5: Preparation of the Wendelstein 7-X Commissioning 75

Hans-Stephan Bosch, Max-Planck-Institut für Plasmaphysik, Greifswald, Germany

ThPO-11: FLUCTUATION MITIGATION AND AZIMUTHAL VELOCITY PROFILE REGULATION BY EXTREMUM SEEKING IN HELCAT 79

Zeki Ilhan, Lehigh University

WO1-5: DIII-D Accomplishments and Plans in Support of Fusion Next-Steps 85

Richard Buttery, GA

ThO1-3: Acoustically Driven Magnetized Target Fusion 93

Michel Laberge, General Fusion

ThPO-12: Plasma Centre-Post for Spherical Tokamaks 100

Celso Ribeiro, Instituto Tecnológico de Costa Rica

ThPO-13: A Method of Increasing the Rate of Nuclear Fusion Inside an Iec Device 103

Jose Lopez, FusorTek, Sunnyvale, CA

ThPO-14: Proto-CIRCUS Tilted-Coil Tokamak-Stellarator Hybrid: Construction and Field Line Mapping 108

Francesco Volpe, Columbia University in the City of New York

Fusion Development: R&D facilities, Next Steps and Power Plants

WO1-1: EU DEMO Design and R&D Studies 114

Gianfranco Federici, F4E, Barcelona

FO1-5: Power Production and Environmental Aspects of a Fusion-Hybrid Reactor 122

Terry Kammash, University Of Michigan

TPO-8: Progress in Developing the K-Demo Device Configuration 128

Keeman Kim, National Fusion Research Center

TPO-1: TBR and Shielding Analyses in Support of ST-FNSF Study 133

Laila El-Guebaly, University of Wisconsin

ThO1-1: IFMIF: Steps Toward Realization 139

Juan Knaster, IFMIF

TPO-9: Balance of Plant Challenges for a Near-Term EU Demonstration Power Plant 147

Michael Porton, Culham Centre for Fusion Energy

TPO-2: Progress in Developing the St-FNSF Configuration 153

Thomas Brown, PPPL

TPO-10: Facilities for Quasi-Axisymmetric Stellarator Research 159

Hutch Neilson, PPPL

ThO1-4: The Spherical Tokamak Path to Fusion Power, Revisited 165

Alan Sykes, Tokamak Solutions UK

TPO-11: Concept Design of CFETR Tokamak Machine 171

yuntao song, institute of plasma physics, Chinese academy of sciences

TPO-4: Design Description of the Coaxial Helicity Injection System on NSTX-U 177

Roger Raman, University of Washington

TPO-13: Engineering Design and Steady State Thermomechanical Analysis of the Ifmif European Lithium Target System 181

Davide Bernardi, ENEA C.R. Brasimone, 40032 Camugnano (BO), Italy

TPO-14: Application of Accelerator Based Neutron Sources in Materials Research 186

Elizabeth Surrey, Culham Centre for Fusion Energy

FO1-4: Systems Analysis Exploration of Operating Points for the Korean Demo Program 192

Keeman Kim, National Fusion Research Center

WO1-4: Opportunities for Fusion Materials Science and Technology Research Now and During the Iter Era 197

Brian Wirth, University of Tennessee

TPO-15: Optimizaton of the Snowflake Diverted Equilibria in Cfetr 205

Zhengping Luo, Institute of Plasma Physics, Chinese Academy of Sciences

TPO-16: Scoping Studies for NBI Launch Geometry on DEMO 208

Ian Jenkins, CCFE

TPO-17: Design Integrated System for Power Plant Development 214

Heiko Neuberger, Karlsruher Institut für Technologie (KIT)

TPO-5: Power and Particle Exhaust in an ST-FNSF 220

John Canik, ORNL

TPO-18: Plasma Performance Required for Fusion Power Control Considering Grid Operation in Demo-CREST 226

Ryoji Hiwatari, Central Research Institute of Electric Power Industry

TPO-19: Optimization of Fusion-Fission Hybrid Reactor Fuel Composition 231

Martin Nieto-Perez, CICATA-IPN Unidad Queretaro

Plasma-Material Interactions, First Wall, and Divertors

ThPO-15: Assessment of Copper Based Materials for the Water-Cooled Divertor Concept of the Demo European Fusion Reactor 236

Lorelei Commin, KIT

ThPO-16: Energy and Particle Impact on W Surface for the Case of Repetitive Elms and Re Electrons in Demo Plasmas 240

Yuri Igitkhanov, Karlsruhe Institute of Technology

ThPL-1: Lesson Learned from the Design of ITER Internal Components 246

Michael Ulrickson, SNL

ThO2-3: Tungsten Experiences in ASDEX Upgrade and JET 254

Rudolf Neu, European Fusion Development Agreement, Central Support Unit, Garching

ThPO-17: Development Activities for the Target Elements of the Wendelstein 7-X Divertor 262

Jean Boscary, Max Planck Institute for Plasmaphysics

ThPO-18: Thermal Management Using a Hypervapotron; Part III: Summary of Controlling Parameters 268

Ronald Boyd, Prairie View A&M University

ThPO-20: Investigation into Irradiation Effects in ODS-Alloys Using Ion Implantation and Micromechanical Testing 273

Eleanor Grieveson, Department of Materials, University of Oxford

ThPO-22: PSI Studies at DIII-D 277

Clement Wong, GA

ThPO-23: Thermo-Mechanical Investigation of the New Solid Tungsten Divertor Tile for Special-Purposes at ASDEX Upgrade 283

Nikola Jaksic, Max-Planck-Institute for Plasma Physics

ThO2-2: Wendelstein 7-X High Heat-Flux Divertor Scraper Element 289

Arnold Lumsdaine, ORNL

ThO2-1: Wendelstein 7-X High Heat Flux Components 296

Alan Peacock, IPP Garching Germany

ThPO-32: Impact of High Transient Plasma Loads on Beryllium Damage 304

Igor Kupriyanov, A.A. Bochvar Research Institute of Inorganic Materials

ThPO-33: Fault Analysis of Plasma Facing Component Mounts Using Multiphysics Simulation 309

Dennis Youchison, SNL

ThPO-34: Upward Facing Lithium Flash Evaporator for NSTX_U 315

Lane Roquemore, PPPL

ThPO-35: Results of the Qualification Test for ITER Blanket First Wall Small-Scale Mockups in Korea 320

Suk-Kwon Kim, Korea Atomic Energy Research Institute

ThPO-36: Evaluation of Thermal Conductivity of Unidirectional SiC Composite Enhanced with Carbon Fibers 324

SungHun KIM, Institute of Advanced Energy, Kyoto University

TO4-5: Assessment of an ITER-like Water-Cooled Divertor for DEMO 329

Eliseo Visca, ENEA

ThPO-37: Optimization of Functionally Graded Materials for Plasma Facing Components by Finite Element Methods 335

Deepu Krishnan, IPR

ThPO-38: Anisotropic Heat Transfer Characteristics of Composite Material Enhanced with High Thermal Conductivity Fiber 340

Hyoseong Gwon, Institute of Advanced Energy, Kyoto University, Kyoto, Japan

ThPO-39: He-Cooled Divertor: Study on Low-Temperature Design Using Ta Alloy as Thimble Material 344

Prachai Norajitra, Karlsruhe Institute of Technology (KIT)

ThPO-44: Physics and Engineering Design of the Divertor Scraper Element for the W7-X Stellarator 349

Jeremy Lore, ORNL

ThPO-45: Numerical Analysis and Optimization of Divertor Cooling System 354

Andrei Khodak, PPPL

ThO2-4: Design of the C-Mod Advanced Outer Divertor 360

Rui Vieira, MIT

ThPO-46: Modeling Technique to Predict Fields, Currents and Loads for C-Mod's Advanced Outer Divertor During a Disruption with a 2ma Plasma Current and 9t Toroidal Field 366

Jeffrey Doody, PSFC-MIT

ThO4-3: Heat Transfer Simulation of C-Mod Advanced Outer Divertor 372

Lihua Zhou, MIT

ThPO-47: Modification of NSTX-U Row 1 Outboard and Inboard Divertor Tiles for the Protection of the PF-1C Coils 378

Kelsey Tresemer, PPPL

ThPO-49: Evaluation of Material Erosion from Plasma-Facing Surfaces in Hard Disruptions via Simulated Ablation Due to Heat Flux in Electrothermal Discharges 381

Leigh Winfrey, Virginia Polytechnic Institute and State University

ThPO-51: First Results from the Liquid Lithium Film Experiment (LiLiFEx). 386

Martin Nieto-Perez, CICATA-IPN Unidad Queretaro

ThO4-4: Deuterium Retention in Tungsten at Fuego Nuevo II 391

Gonzalo Ramos, Insituto Politecnico Nacional

ThPO-55: Hardening Parameters for Modelling CuCrZr and OFHC Copper under Cyclic Loadings 395

Mauro Dalla Palma, Consorzio RFX

Chambers, Blankets, and Shields

TPO-21: A Global Mechanical Analysis and Optimization of Vacuum Vessel and Attached Structure of KTX Device 400

Shanshuang Shi, Institute of Plasma Physics, Chinese Academy of Sciences

TPO-22: A Preliminary Concept Design Study of Blanket for Korean Demo Reactor (K-DEMO) 405

Young-Seok LEE, National Fusion Research Institute

TPO-23: Design and Manufacture of the ITER Cryostat 409

Bharatkumar Doshi, ITER Organization

TPO-24: Benchmark Calculations for the Starter Fendl-3.0 General Purpose Neutron Library with Impact on Iiter Analysis 415

Mohamed Sawan, University of Wisconsin-Madison

TPO-25: Numerical Analysis Two-Phase Flow and Heat Transfer of Fuel Particles and Liquid Metal for Waste Transmutation Blanket 420

Weihua Wang, New Star Institute of Applied Technology

TPO-27: Numerical Analysis of Coupling MHD Rectangular Duct Flows 425

Xiujie Zhang, SWIP

TPO-28: A Multi-Layer Breeding Blanket Concept for CFETR Based on PWR Water Condition 430

changle liu, Institute for Plasma Physics, Chinese Academy of Sciences

FO2-4: Transient Electromagnetic Analysis of Selected Blanket Modules of the Iter Blanket System Due to Plasma Disruption 433

Joseph Kotulski, SNL

TPO-31: Flow Distribution Systems for Liquid Metal Cooled Blankets 439

Christina Koehly, Karlsruhe Institute of Technology (KIT)

FO2-1: ITER Blanket Engineering Challenges and Solutions 445

Rene Raffray, ITER Organization

TPO-32: Structural Analysis of the Iter Thermal Shield 453

Chang Hyun Noh, National Fusion Research Institute

TPO-33: Functional Components Design and Analysis of a Korean HCCR TBM in ITER 458

Dong Won LEE, Korea Atomic Energy Research Institute

TPO-36: Structural Analysis Work on ITER Vacuum Vessel 462

Chang Jun, ITER International Organization

TPO-37: APPLICATIONS OF MCCAD FOR THE AUTOMATIC GENERATION OF MCNP 3D MODELS IN FUSION NEUTRONICS 466

Fabio Moro, 1Association EURATOM-ENEA

TPO-38: THE ITER EC-H&CD Upper Launcher: FEM Analyses of the Blanket Shield Module with Respect to Surface and Nuclear Heat Loads 471

Alessandro Vaccaro, Karlsruhe Institute of Technology

FO2-3: In-Service Inspection and Instrumentation for ITER Vacuum Vessel 476

Kimihiko IOKI, ITER Organization

TPO-39: Considerations of Transient Electromagnetic Forces in Structural Behaviors for Iter Shield Blanket Components 482

Alice Ying, UCLA

TPO-40: Structural Design Analysis Considering Contact Stress between KO HCCR TBM Sub-Modules for ITER 488

Kyu In Shin, Korea Atomic Energy Research Institute, Daejeon, Republic of Korea

TPO-43: Further Experimental Validation of Continuum FEM Simulation for Ceramic Breeder Pebble Bed Units 492

Justin Tucker, UCLA

TPO-46: Error Evaluation in Hydrogen Isotope Permeability Measurement of Silicon-Carbide and the Required Degree of Vacuum 498

Yasushi Yamamoto, Kansai University, Faculty of Engineering Science

TPO-47: Final Design and Start of Manufacture of the ITER Vacuum Vessel Ports 503

Yury Utin, ITER Organization

TPO-48: Impact of Pulsed Operation on Lifetime of Demo Blanket 509

Jarir Aktaa, Karlsruhe Institute of Technology

TPO-49: Parametric Analysis of EM Loads Acting on Demo Vertical Segments with Respect to Module's Dimension 513

Ivan Maione, Karlsruhe Institute of Technology

TPO-50: Resonance of the Iter Diagnostic Upper Port Plug with Em Loads During a Plasma Disruption 519

Sunil PAK, National Fusion Research Institute

TPO-51: Influence of Uninsulated Gaps Between Flow Channel Inserts in Ducts of DCLL Blankets 525

Leo Bühler, Karlsruhe Institute of Technology

TPO-52: Influence of Variable Heat Source on Magneto Convective Flows in HCLL Blankets 531

Chiara Mistrangelo, Karlsruhe Institute of Technology

Magnets

TPO-53: Novel Use of Water Soluble Aquapour as Temporary Spacer During Coil Winding for the NSTX-U Centerstack 537

Michael Mardenfeld, PPPL

TPO-54: Mechanical Analysis for ITER Upper ELM Coil 541

Shanwen Zhang, Institute of Plasma Physics Chinese Academy of Sciences

TPO-56: Conceptual Design and Analysis of CFETR Magnets 546

Xufeng Liu, Institute of Plasma Physics, Chinese Academy of Sciences

TPO-58: SOLDER DEVELOPMENT AND FABRICATION TECHNIQUES FOR COOLANT TUBE BONDING IN TOROIDAL FIELD CONDUCTORS FOR THE NATIONAL SPHERICAL TOURUS EXPERIMENT CENTER STACK UPGRADE 550

Stephan Jurczynski, PPPL

TPO-59: Electromagnetic Loads Prediction and Structural Analysis of HL-2M Toroidal Field Coils 556

Lijun Cai, Southwestern Institute of Physics

TO2-4: The Current Leads of the Wendelstein 7-X Superconducting Magnet System 561

Thomas Rummel, Max-Planck-Institut für Plasmaphysik

TPO-60: Mechanical Design of the Central Solenoid Assembly for the JT-60SA Tokamak 567

Katsuhiko Tsuchiya, Japan Atomic Energy Agency

TPO-61: The Tolerance Analysis for Iter Feeder Ctb&sbbs Components 572

Sumei LIU, Institute of Plasma Physics , Chinese Academy of Sciences

TPO-62: Concept Design of Hybrid Superconducting Magnet for CFETR Tokamak Reactor 576

Jinxing Zheng, Institute of Plasma Physics, Chinese Academy of Sciences

TPO-63: Development of a Process to Build Polyimide Insulated Magnets for Operation at 350 C 582

Irving Zatz, PPPL

TPO-64: Experiences from the Installation of the Superconducting Bus Bar System of Wendelstein 7-X 587

Kerstin Rummel, Max Planck Institute for Plasma Physics, EURATOM Association, Wendelsteinstr. 1, 17491 Greifswald

TPO-65: Electromagnetic and Structural Analyses of the Iter Central Solenoid Feeder Structures 592

Ali Zolfaghari, PPPL

TPO-66: Thermal Analysis of the Iter Tf Feeder Cryogenic Components 597

Zhong Wang, Institute of Plasma Physics, Chinese Academy of Science

TO2-1: Design and Manufacturing Studies for Iter in-Vessel Coils 602

Michael Kalish, PPPL

TPO-67: Design and Analysis of the Iter Tf Feeder Dry Box 608

Guang Shen, Institute of Plasma Physics, Chinese Academy of Sciences

ThO3-2: Radial Cooling of a Spherical Torus (st) Tf Centerpost 612

Robert Woolley, PPPL

TPO-68: Axisymmetric Simulations of the Iter Vertical Stability Coil 618

Peter Titus, PPPL

TPO-69: A Preliminary Conceptual Design Study for Korean Fusion Demo Reactor Magnets 624

Sangjun Oh, National Fusion Research Institute

TPO-71: Reduction of Eddy Currents Induced by Resonant Magnetic Perturbation Coils by Inserting High Permeability Materials 630

Yonghua Ding, State Key Laboratory of Advanced Electromagnetic Engineering and Technology, Wuhan, 430074, China

TPO-72: W7-X Trim Coils - Component Safety Aspects and Commissioning Strategy 634

Konrad Risse, Max-Planck-Institut für Plasmaphysik

TPO-73: Manufacturing of the First Toroidal Field Coil for the Jt-60sa Magnet System 638

Antonio Cucchiaro, ENEA

TPO-74: Identifying the Cause of the NSTX TF Coil Bundle Failure 644

Lawrence Dudek, PPPL

TO2-3: ITER Central Solenoid Module Fabrication 648

John Smith, GA

TPO-76: THERMAL AND STRUCTURAL ANALYSIS OF THE ITER ELM COILS 652

Arthur Brooks, PPPL

TO2-2: ITER Central Solenoid Design 658

David Everitt, ORNL

MFE Plasma Heating and Current Drive

ThPO-56: Filament Power Supplies (Ac-Ac Converters) and Their Design for Long Pulse

Neutral Beam Injector of SST-1 666

Dipalkumar Thakkar, IPR

ThPO-57: The ITER ECH&CD Upper Launcher: Steps Towards Final Structural Design of the First Confinement System 670

Peter Spaeh, KIT

ThPO-58: Effect of Magnetic Field on Voltage Holding in the Mitica Electrostatic Accelerator 676

Nicola Pilan, Consorzio RFX

ThPO-59: Simulational Studies of the Wire-Array Z-Pinch Implosions 682

Ning Ding, Institute of Applied Physics and Computational Mathematics (IAPCM)

ThPO-60: Theoretical and Experimental Investigations on the Interaction of Wire-Array Z-Pinch with Low Density Foam 688

Delong Xiao, Institute of Applied Physics and Computational Mathematics

ThPO-61: Study of Protection Strategies Against Breakdown Effects in the SPIDER Experiment 693

Alberto Pesce, Consorzio RFX, Associazione Euratom-ENEA sulla Fusione