17th International Symposium on Fusion Nuclear Technology (ISFNT-17)

6 September 2027 - 10 September 2027

EICC, Edinburgh

Scientific Programme

Plasma-Facing High Heat Flux Components

These are the components that directly face the extremely hot fusion plasma, such as divertors and first-wall surfaces. They must withstand intense heat loads, particle bombardment, and radiation while maintaining structural integrity and removing heat efficiently.

Blanket Technology

The blanket surrounds the fusion plasma and serves multiple purposes, including capturing energy from fusion neutrons and breeding tritium fuel. It is a critical system for converting fusion energy into usable heat and enabling a self-sustaining fuel cycle.

Fuel Cycle and Tritium Processing

This area focuses on the production, recovery, storage, and purification of fusion fuels, particularly tritium. Efficient fuel-cycle systems are essential for maintaining reactor operation while minimizing fuel losses and ensuring safe handling of radioactive materials.

Material Engineering for FNT

Fusion reactors expose materials to extreme temperatures, neutron radiation, and mechanical stresses. This field develops and tests advanced materials that can survive these harsh conditions while maintaining performance over long operating lifetimes.

Vacuum Vessel and Ex-vessel Systems

The vacuum vessel contains the plasma and provides the primary confinement boundary within the reactor. Ex-vessel systems include support equipment outside the vessel, such as cooling, shielding, diagnostics, and processing systems that enable safe and reliable plant operation.

Nuclear System Design

This discipline integrates reactor components into a complete nuclear system and analyzes how neutrons, heat, materials, and structures interact. The goal is to optimize performance, efficiency, maintainability, and regulatory compliance of the fusion power plant.

Safety Issues and Waste Management

Fusion reactors must safely manage radioactive materials, activated components, and operational hazards. This area evaluates accident scenarios, radiation protection strategies, waste minimization approaches, and pathways for disposal or recycling of reactor materials.

Models and Experiments for FNT

Researchers use computational models and experimental facilities to predict and validate fusion technology performance. These studies help reduce technical risk by improving understanding of material behavior, heat transfer, tritium transport, and system interactions before full-scale deployment.

Repair and Maintenance

Because many reactor components become highly radioactive during operation, maintenance often requires remote handling and robotic systems. This field develops methods to inspect, replace, and repair components quickly to maximize reactor availability and reduce downtime.

Burning Plasma Control and Operation

A burning plasma is one in which fusion reactions provide much of the heating needed to sustain themselves. This area focuses on monitoring, controlling, and optimizing plasma performance to ensure stable, safe, and efficient reactor operation while preventing disruptions and damage to reactor components.