ATOMCRAFT
Building the Future Fusion Workforce

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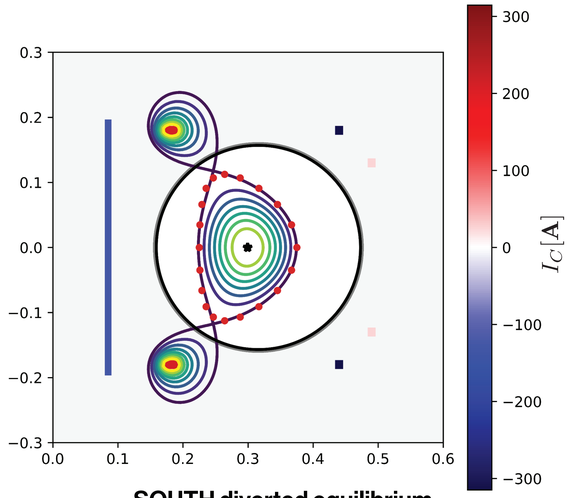
CURRENT FUSION WORKFORCE

Fusion energy is facing a significant **skills bottleneck**. Workforce capability has not kept pace with the accelerating investment and research momentum. Few undergraduate-level training opportunities currently exist that provide students with experience in the engineering, manufacturing, and integration of fusion-relevant systems. **AtomCraft responds directly to this gap**. It offers students **early-stage exposure** to fusion system development, equipping them with the **engineering skills** and context needed to contribute meaningfully to the field.

FUSION EDUCATION REIMAGINED

AtomCraft is a **student project** based at UNSW Sydney, launched in early 2024. The project's objective is the design, construction, and operation of a small-scale fusion device by undergraduate students from all faculties. The initiative seeks to make fusion engineering accessible at an earlier stage of education. Students engage with vacuum system design, magnets, electronics and RF heating infrastructure. AtomCraft places emphasis on the full engineering design and build lifecycle with real-world constraints.

AtomCraft Team, June 2024
The team has since grown to 70+ Students.



SOUTH diverted equilibrium
Computed with Tokamaker; $I_p = 3$ kA, $\kappa = 1$, $\delta = 0$.

MENTORSHIP AND PARTNERSHIP

AtomCraft bridges academic excellence with real-world application through strong collaboration with stakeholders across the international fusion industry. Academics and industry partners provide the structure, support, and insight necessary to guide students through meaningful and technically robust projects that address real industry challenges.

Key features of this collaborative model include:
- Academic mentors ensure rigorous **scientific and engineering standards** while fostering a rich learning environment.
- Industry partners contribute **technical oversight** and real-world perspectives. Organisations such as **Tokamak Energy** and **HB11 Energy** directly inform design decisions.

This integrated academic-industry model:
- Strengthens AtomCraft's professional **credibility**.
- Aligns outcomes with the **evolving workforce** needs of the fusion sector.

THE SOUTH TOKAMAK

Student Operated Undergraduate Tokamak with rf Heating

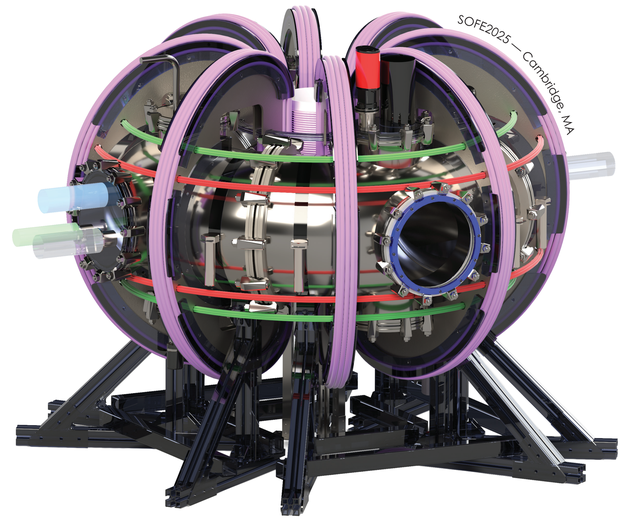
Toroidal Field Strength: ..... 100 mT
Plasma Pulse Duration: ..... 100 ms
Peak Plasma Temperature: ..... 10 eV
Peak Plasma Current: ..... 3 kA
Breakdown Method: ..... Ohmic + 2.45 GHz ECRH

The machine is intended as a demonstrator of subsystem integration, pulsed operation, and student-driven engineering. Parameters were selected to balance feasibility, pedagogical value, and relevance to early-stage fusion machine design.

TEAM STRUCTURE

Responsibilities are divided into two core engineering streams, with subdivisions each lead and integrated by students and supervised by relevant academics:
- **Plasma & Power Engineering** – Plasma scenario, energy storage and power delivery, coil control, RF engineering.
- **Plant Engineering** – Systems engineering, vacuum and fueling, structural design.

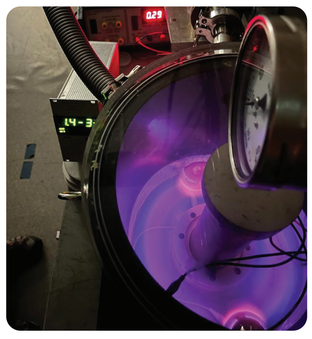
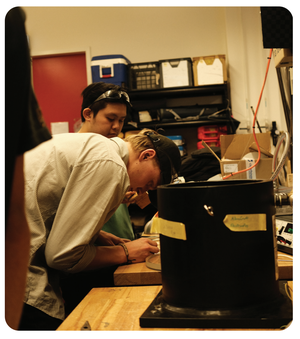
Each department mirrors the collaborative workflow found in real engineering projects, ensuring technical depth and accountability. This structure cultivates leadership, communication, and systems-level thinking – critical skills for the future fusion workforce. This model:
- Encourages ownership and initiative.
- Provides direct **mentorship** from experienced engineers.
- Enables **iterative**, systems-based project cycles.
- Simulates the complexity of **real-world** fusion efforts.



Render of SOUTH tokamak

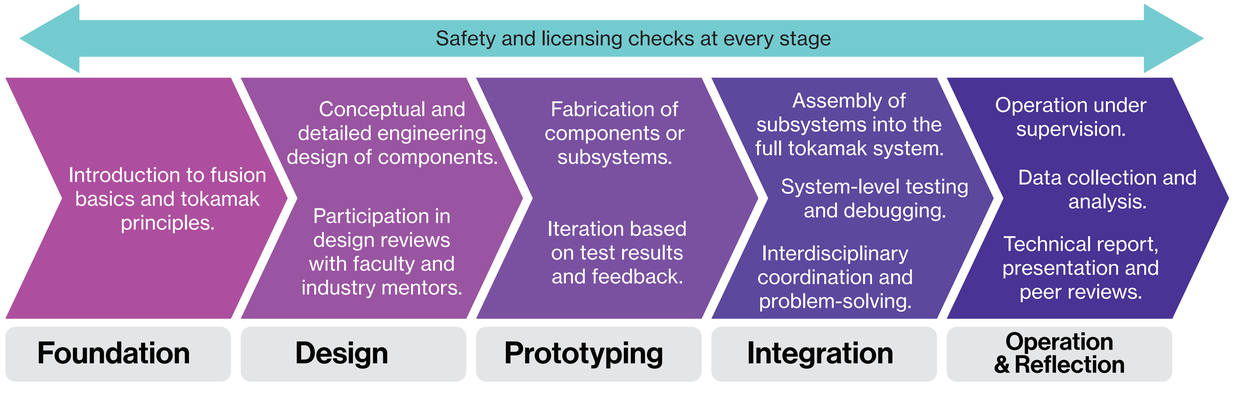
A MODEL FOR THE FUTURE

AtomCraft is the new model for training fusion engineers. It focuses on practical learning, industry collaboration, and repeated hands-on projects. Key featured include:
- **Scalable:** Does not require expensive labs; accessible to many institutions.
- **Practical Approach:** An emphasis on project-based learning with real challenges.
- **Iterative Design:** Frequent design-build cycles, each focused on specific goals (e.g., fueling, diagnostics).
- **Skill Building:** Trains students to think systematically, work in teams and build safely.
- **Mission-Driven:** More than a course – it's a foundation for powering the future of fusion.

Early glow discharge cleaning tests & first plasma

Learn more about us by scanning the QR Code



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