Foreword

Special issue featuring Young Investigators in Fusion

Guest Editor
John Echols
United Kingdom Atomic Energy Agency

In the fusion sector, the challenge we face is undoubtedly one of the most difficult scientific and engineering problems ever attempted by humanity. This challenge and the promises of fusion attract some of the most motivated and passionate researchers in the world. It is, therefore, my great privilege to introduce the first special issue of *Fusion Science and Technology* highlighting the work of young investigators in the fusion field.

Admittedly, you could consider "young" a misnomer when applied to most to doctoral-level individuals. The goal of this issue is to increase the visibility of fusion scientists early in their careers who have led their work as first (and in one case, co-first) authors. These scientists come from diverse backgrounds, countries, and institutions, but to fit the spirit of this issue, all were either still in schooling in pursuit of a degree or were less than 5 years out from the awarding of their doctoral degree at the time of being invited to submit. The result is a collection of cutting-edge papers from voices establishing their prominence in the field.

Interest and funding for fusion have increased rapidly in the past two decades. The number of private fusion companies has increased by over a factor of 10 (Ref. 1), and the inflation-adjusted funding from the U.S. Department of Energy has increased by roughly 50% (Ref. 2). As the field of fusion research tackles more and more difficult challenges, *how the community supports new researchers will have tremendous and compounding effects on our ability to get energy on the grid*. Whether these effects compound positively or negatively hinges on how the community embraces new blood.

In the 2019–2020 community plan for fusion energy,[3] focus group interviews were conducted for early-career scientists and engineers. Several areas where these researchers want to see more focus include

1. A sense of urgency in the development and implementation of fusion energy.
2. Mentorship opportunities.
3. Opportunities to engage with funding bodies.
4. Grants targeting early-career professionals.
5. Elimination of institutionalized barriers to advancement that are based in discrimination, unconscious bias, harassment, and other gatekeeping behaviors.

Academic journals have a key place in establishing the kinds of positive feedback loops that are needed to grow and progress fusion energy. Along with the entire editorial board of *Fusion Science and Technology*, I am proud to highlight this rising generation's excellent research. However, as can be seen from the needs listed above, journals cannot establish this feedback loop alone. Principal investigators, institutes, mentors, and funding bodies all have a role to play in supporting new researchers. Embracing the urgent need for fusion energy will motivate and attract new talent. Everybody should help ensure that our conferences, laboratories, and institutes are spaces where all researchers feel safe, empowered, and that they belong.

I hope you find the following papers and investigators interesting and look forward to many more such special issues!

References

1. *The Global Fusion Industry in 2021: Fusion Companies Survey by the Fusion Industry Association and the UK Atomic Energy Authority* (2021); available at https://drive.google.com/file/d/17lrqxt6NG0-QjVafJ_WHbT43kSGiK-WD/view (current as of Oct. 20, 2022).
2. R. MARGRAF, *A Brief History of U.S. Funding of Fusion Energy*, Stanford University (2021); http://large.stanford.edu/courses/2021/ph241/margraf1/ (current as of Oct. 20, 2022).
3. S. BAALRUD et al., "A Community Plan for Fusion Energy and Discovery Plasma Sciences," arXiv.2011.04806 (2020); https://doi.org/10.48550/arXiv.2011.04806.