

**In the spirit of Professor Mima's vision for US-Japan collaboration:
Discovery of a self-organized gamma-gamma collider**

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Prof. Mima was widely recognized as a generous mentor who consistently supported young scientists and fostered international collaboration. He often offered guidance and encouragement without seeking recognition, leaving a lasting impression on those who worked with him. As a senior and deeply respected figure in the field of plasma physics, his support played a pivotal role in shaping many careers and research directions. Among his many contributions, Prof. Mima was an active participant in the Joint Institute for Fusion Theory (JIFT), through which he championed US-Japan scientific exchange and created enduring opportunities for bilateral collaboration.

Established to strengthen theoretical research in fusion and plasma science, JIFT [1] has long served as a platform for connecting researchers from the United States and Japan. Through workshops and exchange visits, it enables scientists to share expertise, launch joint projects, and build long-term partnerships. Prof. Mima embraced this mission, actively contributing to the kind of sustained, cross-border collaboration that continues to shape the field today.

I first met Prof. Mima at a JIFT workshop in Austin, Texas in 2008 — an experience that left a lasting impression on me. It was there that I first witnessed his openness, thoughtful engagement, and quiet encouragement that would come to define his interactions with so many others. Since then, I have organized multiple JIFT workshops, many of which Prof. Mima attended. His continued participation and willingness to offer insight, ask questions, and encourage young researchers reaffirmed that my early experience was not an exception but a reflection of his consistent character. The accompanying photo from that 2008 workshop is a reminder of the scientific connections and mentorship he helped foster—connections that have shaped careers, projects, and collaborations across borders.

This talk presents a collaborative project that grew out of the international exchange and mentorship that JIFT was designed to promote — and that Prof. Mima championed throughout his career. In this work, US and Japanese researchers combined their complementary expertise to explore how a dense, laser-irradiated plasma can self-organize into a configuration that effectively acts as a gamma-gamma collider [2]. This surprising mechanism opens a pathway for observing electron-positron pair production from light alone — a hallmark prediction of quantum electrodynamics — in experiments that may be feasible in the near term.

References

- [1] <https://www.nifs.ac.jp/research/Japan-US/JIFT>
- [2] K. Sugimoto et al, PRL **131**, 065102 (2023).



Participants at the JIFT Workshop on Theory and Simulation on Ultra-Intense Laser Plasmas (November 2008, University of Texas at Austin).