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# Sun-Mo-Spe1-06: [Invited] Recent advancement in pulsed magnet technology at high-field facilities

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Pulsed high magnetic fields play a crucial role in advancing numerous scientific disciplines, including condensed matter physics, materials science, chemistry, and biology. Unlike steady magnetic fields, pulsed magnetic fields reach significantly higher field strengths for short durations, enabling unique experimental conditions.

The concept of pulsed field magnets dates back to the early 20th century. In 1924, Kapitza first demonstrated the possibility of a pulsed magnet, using a copper sheet and lead-acid batteries, to generate magnetic fields up to 50 Tesla. Since this pioneering achievement, significant advancements have been made in pulsed magnet technology, e.g., capacitor banks, switching technology, high-strength wires, and magnet designs. These technological advancements have continuously pushed the boundaries of maximum attainable magnetic fields.

Today, modern pulsed magnets routinely generate fields exceeding 70 Tesla for a few to tens of milliseconds at large high-fields facilities around the world (Los Alamos, Toulouse, Dresden, Wuhan, and Kashiwa), and some facilities reach even higher magnetic fields up to 100 Tesla. One of the greatest challenges in pulsed magnet technology is managing the enormous electromagnetic stresses. At a magnetic field of 100 Tesla, these stresses can reach up to 4 GPa, which requires the design and construction of magnets capable of withstanding such extreme forces without failure.

In my presentation, I will provide an overview of how each of these high-field facilities has contributed to the development of high-strength wires and innovative magnet designs, which are essential in achieving even higher magnetic fields.

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