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Physics Opportunities at the High Intensity Heavy-ion Accelerator Facility (HIAF)

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High Intensity Heavy-ion Accelerator Facility (HIAF) is one of China's major scientific and technological infrastructure projects and one of the world's largest ion accelerators capable of accelerating all ions. HIAF is designed to deliver the intense pulsed heavy-ion beams, comprises a superconducting ion linear accelerator, a high-energy synchrotron booster, a high-energy radioactive isotope beam line, a spectrometer ring, and several advanced experimental platforms. After seven years of construction, HIAF completed its first oxygen beam commissioning in October 2025 and first bismuth beam commissioning in December 2025. HIAF features unprecedented intense ion beams from hydrogen through uranium, by which a large variety of exotic nuclear matters not existing on Earth can be produced, including super-heavy nuclides, short-lived extremely neutron-rich and proton-rich nuclides, finite nuclear matters in the Quantum Chromodynamics phase diagram, exotic nuclides containing hyperons and other hadrons, meson-nucleus bound systems, and highly-charged ions. Therefore, HIAF will be one of the world's leading heavy-ion accelerator complexes in the envisaged future. As a scientific user facility, researchers from all over the world can approach the experimental limits and open new domains of physics research.

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