

JITCP Seminar

THE UNIVERSITY OF HONG KONG

HKU-UCAS JOINT INSTITUTE OF THEORETICAL AND COMPUTATIONAL PHYSICS

[Thursday afternoon, 4:00 pm, Zoom (online)]

Exploration of new superconductors under high pressure

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As one of the fundamental parameters governing the states of matter, high pressure has been widely employed to explore various distinct structural and/or electronic phases that are inaccessible at ambient conditions. The application of high pressure can thus expand substantially the phase space of condensed matters and offers more opportunities to discover novel quantum materials and phenomena. The recent discovery of near-room-temperature superconductivity in the lanthanum superhydrides represents one of the most celebrated examples in this direction. In addition, unconventional magnetism-mediated superconductivity also emerges frequently near the pressure-driven magnetic quantum critical point in strongly correlated electron systems. In this talk, I will present our recent progresses in exploring new superconductors by using high-pressure approach, including (1) a new superhydride superconductor SnH_x synthesized at about 200 GPa and 1700 K, showing transport evidences of superconductivity at $T_c \approx 70$ K with a low upper critical field $B_{c2}(0) \approx 11$ T^[1]; (2) a perovskite-type oxide analogy of hydride superconductors with T_c up to 17 K; (3) the first ternary Mn-based superconductor AMn_6Bi_5 ($A = \text{K, Rb}$) with T_c up to 9.5 K achieved by suppressing its long-range antiferromagnetic order under high pressure^[2, 3]; (4) a new magnetic superconductor EuTe_2 that shows the coexistence and concomitant enhancement of the superconducting T_c and the antiferromagnetic T_N at pressures above 6 GPa^[4].

References

1. Mater. Today Phys. **22**, 100596 (2022).
2. Phys. Rev. Lett. **128**, 187001 (2022).
3. Chin. Rev. Lett. **39**, 067401 (2022).
4. Nature Commun. **13**, 2975 (2022)

Online Zoom Seminar

Thursday, February 9, 2023, 4:00 pm

Meeting ID: 985 4111 5297, Password: 25600

<https://hku.zoom.us/j/98541115297?pwd=YXpVKzRnc2pDeHlvMjhXSnlFTHBtdz09>

Host: Professor Gang CHEN, The University of Hong Kong

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