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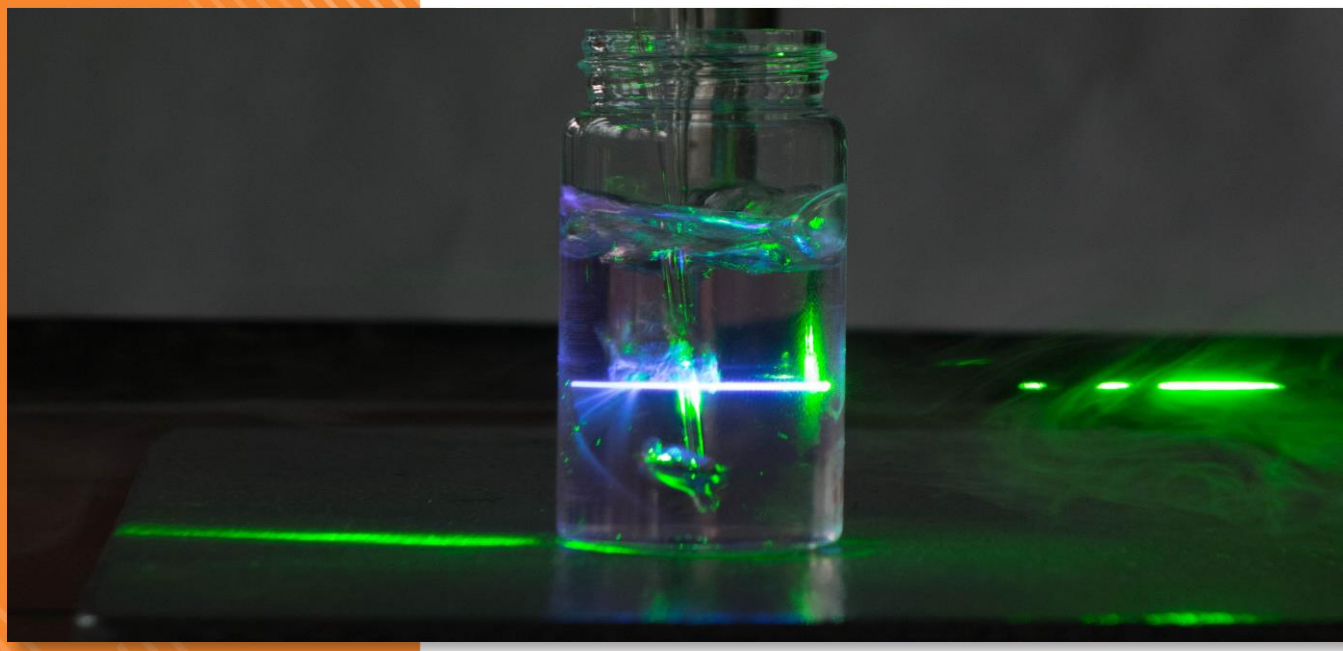

Crystals and crystal growth from the lens of a physicist

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How are new materials discovered, particularly those with unique quantum properties? While serendipity plays its part, the intentional design of materials to realize specific physical phenomena—such as exotic spin Hamiltonians—drives much of contemporary condensed matter physics. In this talk, I will discuss an essential aspect of this journey: the growth of large, high-quality single crystals of quantum materials. Starting from why crystals are indispensable to condensed matter physics and much of modern technology, we will discuss how crystals are grown in a lab using examples from floating-zone and vapor-transport techniques. In the floating-zone technique one uses a mirror or image furnace to grow crystals from the melt, while in the vapor-transport technique the material to be grown is vaporized (either in its nascent form or by turning it into a volatile phase), and growth of crystals of the desired phase occur through the condensation of these vapors. The two techniques together, therefore, cover a wide spectrum of quantum materials. I will present examples from my research of the interesting new physical phenomena one can explore using these crystals.

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Hörsaal FZH3
Campus Freudenberg

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