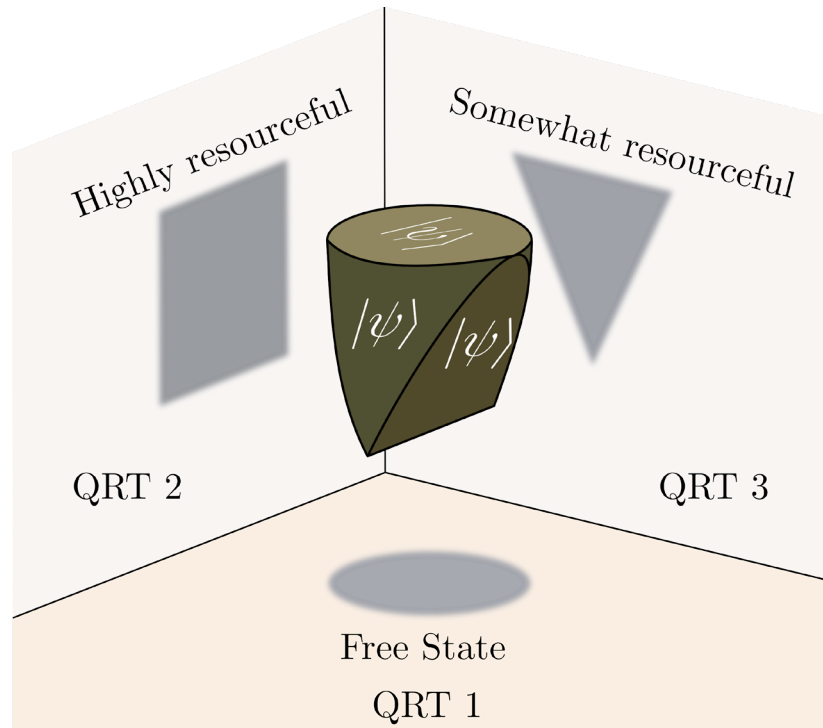


Cross-examining a quantum state's resources



We showcase the fact that the resource in quantum states is relative to the QRT through which it is analyzed.

Scientific Achievement

We analyze the resourcefulness of families of states across several quantum resource theories (QRTs).

Significance and Impact

The characterization of a state's resourcefulness is crucial to understand, e.g., if it can be classically simulated, or useful for information protocols. However, there is not a single notion of "resource", and our work showcases this phenomenon.

Research Details

We analyze the resourcefulness in free states for-and across witnesses of-the QRTs and we provide rigorous theoretical results as well as numerical studies showcasing the rich and complex behavior that arises in this type of cross-examination.

A. E. Deneris, P. Braccia, P. Bermejo, N. L. Diaz, A. A. Mele, and M. Cerezo.
"Analyzing the free states of one quantum resource theory as resource states of another." Advanced Quantum Technologies 9, e00702 (2026).
DOI: 10.1002/qute.202500702

Cross-examining a quantum state's resources

- **NQISRC Intellectual Role:** *Lead*
- **NQISRC Funding Role:** *Majority*
- **Explanation of Funding Institution Contributions**
 - DOE Office of Science, Quantum Science Center, led the development and presentation of the results.