Hamiltonian identifiability assisted by single-probe measurement
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TUM ENGINEERING GROUP TEAM — We study the Hamiltonian identifiability
of a many-body spin-1/2 system assisted by the measurement on a single quantum
probe based on the eigensystem realization algorithm (ERA) approach employed in
[Phys. Rev. Lett. **113**, 080401 (2014)]. We demonstrate a potential application of
Gröbner basis to the identifiability test of the Hamiltonian, and provide the neces-
sary experimental resources, such as the lower bound in the number of the required
sampling points, the upper bound in total required evolution time, and thus the
total measurement time. Focusing on the examples of the identifiability in the spin
chain model with nearest-neighbor interaction, we classify the spin-chain Hamilto-
nian based on its identifiability, and provide the control protocols to engineer the
non-identifiable Hamiltonian to be an identifiable Hamiltonian.

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