

# Workshop on Frontiers in Quantum Materials



**September 1 – 5, 2025**

**ICTP-SAIFR, São Paulo, Brazil**

**Venue: Principia Institute**

**ID: 862 8678 4162**

**Password: quantum**

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**Home**

**Invited Speakers**

**Registration**

**Program**

**GROUP 1 (Monday and Thursday)**

- **Picoli, Felipe Donizete** (São Carlos Institute of Physics, University of São Paulo, Brazil): *Tangent Krylov Solver : efficient matrix product state based computation of real-frequency spectral functions*

We present a tangent Krylov method for the efficient computation of real-frequency spectra from ground-state matrix product states (MPS) obtained via the Density Matrix Renormalization Group (DMRG). The key idea is to project the resolvent operator onto the tangent space of the ground-state MPS, allowing for an accurate and compact Krylov-space representation. The novel approach enables the direct calculation of spectral weights along the real-frequency axis. We demonstrate the method's robustness and versatility by applying it to a variety of systems, including the Haldane-Shastry model on a ring and interacting fermionic models, such as quantum impurity systems.