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## Effect of DM Interaction in the charging process of a Heisenberg spin chain quantum battery

We investigate the charging performance of an anisotropic XYZ model of Heisenberg Spin Chain Quantum Battery (HS QB) along with different components of Dzyaloshinskii-Moriya Interaction (DMI) for three cases - short range, long range and infinite range interactions. We find that the presence of DMI enhances the charging power and total stored energy of the QB considered here, when compared to HS QB in most of the cases, by considering both local and collective charging protocols. The maximum stored energy increases linearly with the number of spins ( $N$ ). An extensive scaling of maximum charging power with the number of spins is obtained in which the maximum power approaches a scaling exponent  $\alpha = 1.846$  for collective charging of the model consisting of Heisenberg spin chain with Y component of DMI under infinite range interactions. Finally, we optimize the performance of the battery by measuring the quantum energy fluctuations with in the system.

### Theme

Theme 1. Energy advantage and cost of quantum technology

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**Track Classification:** Theme 2. Quantum effects in energy processes and materials