

## Infinite Tensor Rings

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While creating a flexible power method for computing the leftmost, i.e., algebraically smallest, eigenvalue of an infinite dimensional tensor eigenvalue problem,  $Hx = \lambda x$ , where the infinite dimensional symmetric matrix  $H$  exhibits a translational invariant structure, we study the theory of infinite Tensor Rings (iTRs). Under the assumption that the smallest eigenvalue of  $H$  is simple, representing the eigenvector as a translational invariant iTR allows the use of power iteration of  $e^{-H}$ . In order to implement this power iteration, we use a small parameter  $t$  so that the infinite matrix-vector operation  $e^{-Htx}$  can efficiently be approximated by the Lie product formula, also known as Suzuki–Trotter splitting. In this talk we further explain the motivation for defining iTRs and present their derived and used mathematical properties.