

LCT Sample Code

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Lightcone Conformal Truncation (LCT) is a novel algorithm for studying strongly-coupled quantum field theories in real time and infinite-volume. At present, LCT is written in **Mathematica**. This repository contains LCT code samples to give the reader a sense of what goes on behind the scenes computationally. There are two folders: one for the two dimensional (2D) code and one for the three dimensional (3D) code. The files within each folder are as follows:

2D Code Sample

- `2D_Phi4_Demo.nb`: This notebook demonstrates how to use LCT to study 2D ϕ^4 theory, including computing the spectrum and two-point correlation functions at arbitrary coupling. This demo was created by Zuhair and Matt based on the analysis done in the two papers [arXiv:1704.04500](#) and [arXiv:2005.13544](#). The demo calls the packages `Basis-Scalar.wl` and `MatrixElements-Scalar.wl`.
- `Basis-Scalar.wl`, `MatrixElements-Scalar.wl`: These are the latest packages for generating the 2D LCT scalar field basis and Hamiltonian matrix elements, respectively. These packages were written primarily by Yuan, taking original code written by Zuhair, Matt, and Nikhil in [arXiv:1704.04500](#) and implementing the analytical improvements developed in [arXiv:2005.13544](#).

3D Code Sample

- `GenerateBasis_3D.nb`: This is the code for generating the 3D LCT scalar field basis, written by Zuhair. The algorithm is described in a step-by-step fashion in Appendix B of [arXiv:2010.09730](#). This was the code used to analyze 3D ϕ^4 theory in the same paper.