An overview of NRPy+

Python-based code generation for numerical relativity... and beyond!

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What is NRPy+?

★ A collection of Python modules for efficient, infrastructure agnostic C code generation

★ SymPy-based symbolic algebra

★ Specially designed for numerical relativity
  ✳ Indexed expression support using simple Python lists
  ✳ Derivatives represented using arbitrary order finite differences

★ Latest codebase is particularly useful for large, complex projects
  ✳ The standard is to generate one source file per function
  ✳ Automatic Makefile generation

https://nrpyplus.net

★ Completely open-source under the 2-Clause BSD license

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Existing NRPy+-based codes

★ BlackHoles@Home: Citizen-science project for large BBH GW catalog generation

★ Baikal/BaikalVacuum: BSSN thorns for the Einstein Toolkit

★ NRPyElliptic: Numerical relativity initial data solver (currently only supports puncture BBH)

★ NRPyLeakage: Neutrino leakage support

★ NRPyEOS: Equation of state support

★ NRPyCritCol: Designed to study critical collapse of scalar fields

★ NRPyPN: Post-Newtonian calculation of binary initial data parameters

★ SphericalNR: Uses NRPy+ to generate a NR code in Spherical coordinates

★ In the NRPy+ GitHub repository you will also find many complete codes for e.g., BH collisions