P108a **Athena++: a New RMHD Simulation Code with Adaptive Mesh Refinement**

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We report the current status of the Athena++ project, which completely redesigns the Athena MHD code (Stone et al. 2008) from scratch. This code aims to achieve good performance and scalability on modern supercomputers with various architectures, support flexible coordinate systems including general relativity, and include many physical processes such as radiation transfer, self-gravity and non-ideal MHD effects for various astrophysical applications. So far, we have implemented hydrodynamics and MHD on uniform grids. The benchmark tests using Cray XC30 show that the code weak-scales excellently maintaining $\sim 1.5 \times 10^6$ (cells / sec / process) for hydrodynamics and $\sim 8.0 \times 10^5$ (cells / sec / process) for MHD. We also test scalability on IBM BlueGene/Q and it weak-scales perfectly up to 4096 nodes, 262144 processes. We also have implemented static mesh refinement for hydrodynamics, and its performance is as good as uniform grid even with 10 levels of refine ment. In this talk, we describe the design of the code and report the progress of implementation of adaptive mesh refinement.