Huarte Espinosa's Magnetic Towers and Binary-Formed Disks Request

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Request Review(s) Index:

Review #1

Assessment And Summary:	This proposal aims to understand the physics of jets, supersonic collimated outflows, in Young Stellar Objects, Proto-Planetary Nebulae (PPN), and other astrophysical objects. The code methodology appears appropriate, but scaling data is scarce and the computational research plan lacks essential details to assess the feasibility of the plan. It is suggested to award 1.15M SU to complete 10, 20, and 30 AU runs of binaries, and 1.34M SU for the 1.0, 10, and 100 magnetic tower runs. This will enable the team to achieve some research goals, and provide sufficient resources to establish a relevant scaling.
Appropriateness Of Methodology:	The code used is AstroBEAR, a fully parallelized, multi-dimensional AMR MHD code. The multiphysics capabilities of AstroBEAR include solvers for elliptic and parabolic equations. Using the linear system solver HYPRE, self-gravity, heat conduction and magnetic resistivity are included. Radiation transfer in the diffusive limit is being added. This multi-physics code, and its numerical implementation, appears to be appropriate for the proposed tasks.
Efficient Use Of Resources:	Quantitative scaling data is not provided in a standard weak or strong scaling, but uses an undefined "running efficiency", and it is unclear why only 5 different run scales have been used when the code apparently scales over a very wide range. In addition, scaling is only shown for 1 AMR level, but the proposed runs will use 3, 5, and 6 levels. It is therefore not possible to assess fairly the efficiency of the proposed runs.
Appropriateness Of Computational Research Plan:	The computational research plan lacks necessary detail, in particular the core utilization, with only one vague reference to "about 10,000 cores for a typical production run. Without the core utlization for each proposed run, it is not possible to assess the feasibility of the research plan. For a large request of 8M SUs, such details are absolutely essential.
Overall Rating:	Good

NICS Cray XT5 (Kraken)

Suggested Amount:	1340000
Comments:	

TACC Sun Constellation Cluster (Ranger)

Suggested Amount:	1150000
Comments:	

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Review #2

Assessment And Summary:	This proposal seeks time to study the formation and evolution of magnetic jets in binary systems. Team has a good track record in computation, and provides evidence of grant support. Despite the strengths of this proposal, I recommend a scaled back allocation for this project of 2MSUs for the following reasons: 1) The efficiency of resources is not demonstrated for the code in the mode to be used for the proposed work, specifically, no scaling data is provided for the levels of AMR expected (proposers refer to 6+ levels "performing well"). Data is provided for only 4 AMR levels on Kraken, and only 1 level on Ranger. 2) The estimates for the requested resources lack detail. 3) It represents a significane increase in resource usage from previous awards (100 kSU startup). With 2 M-SUs this group will be able to continue their research program, collect better data, and develop a stronger proposal if more computing time is needed to complete their project.
Appropriateness Of Methodology:	The MHD AstroBear code is appropriate for modeling the scenario under investigation.
Efficient Use Of Resources:	Good scaling is shown for the AstroBear code up to 4 levels of AMR on Kraken on up to 12,000 cores, and 1 level of AMR on Ranger up to 4,096 cores. The simulations being proposed, however, may require up to 6+ levels of AMR for which the proposers merely state that the code is "performing well".
Appropriateness Of Computational Research Plan:	
Overall Rating:	Fair

NICS Cray XT5 (Kraken)

Suggested Amount:	1000000
Comments:	

TACC Sun Constellation Cluster (Ranger)

Suggested Amount:	1000000
Comments:	

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