

# Production quality Ecosystem for Programming and Executing eXtreme-scale Applications (EPEXA)

Robert J. Harrison, Stony Brook University [Award #1931387]

Edward Valeev, Virginia Tech [Award #1931347]

George Bosilca and Thomas Herault, University of Tennessee, Knoxville [Award #1931384]

Email: [rharrison@stonybrook.edu](mailto:rharrison@stonybrook.edu) URL: <http://tesseorg.github.io/>

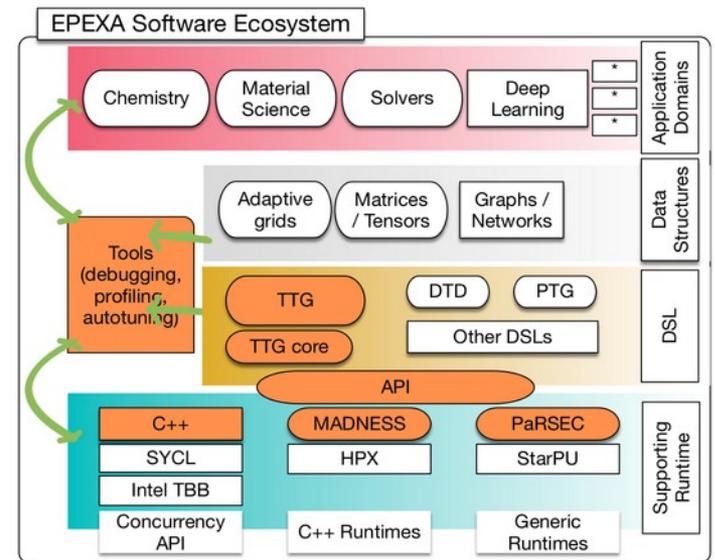
EPEXA will create a production-quality, general-purpose, community-supported, open-source software ecosystem that attacks the twin challenges of programmer productivity and portable performance for advanced scientific applications on modern high-performance computers. Of special interest are irregular and sparse applications that are poorly served by current programming and execution models.

## Intellectual Merit:

- A powerful data-flow programming model for modern C++ and associated parallel runtime optimized for irregular applications.
- Science-driven codesign of the new programming model to accelerate growth of the community of computer scientists and domain scientists employing these tools for their research.
- Directly address multiple challenges faced by scientists as they attempt to employ rapidly changing computer technologies.
- SBU will act as overall project lead with special responsibility for co-design including MADNESS and associated science uses.

## Broader Impacts:

- Create a sustainable model for the community to build upon and support this capability in the future.
- Active community engagement to increase awareness, and adoption of new programming paradigms.
- Strong coordination with Molecular Science Software Institute.



*Image: The EPEXA software ecosystem: the highest level API is runtime agnostic and several backends will be provided, including one building upon ParSEC/TESS that is focused on massively parallel machines with accelerators.*