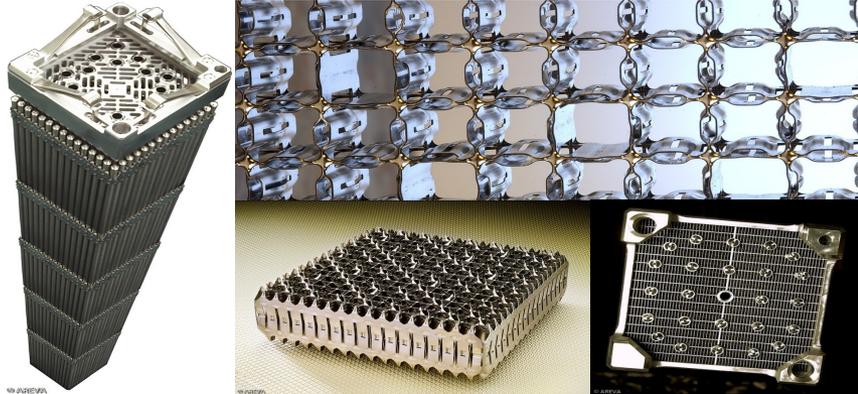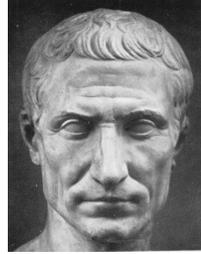# CESAR – Center for Exascale Simulation of Advanced Reactors

Novel Ideas

- Develop innovative, scalable algorithms for neutronics and thermo-hydraulics computations suitable for exascale computers
- Couple high-fidelity thermo-hydraulics and neutronics codes for challenging multi-scale, multi-physics computations
- Drive design decisions for next-generation programming models and computer architectures at the exascale

Impact and Champions

Simulating a complete nuclear power system in fine detail will fundamentally change the paradigm of how advanced nuclear reactors are designed, built, tested and operated.

- Every step of the nuclear regulatory timeline can be compressed by guiding expensive experiment efforts.
- New designs can be rapidly prototyped, accident scenarios can be studied in detail, material properties can be discovered, and design margins can be dramatically improved.
- Scientists can analyze problems for a wide range of novel reactor systems.

Milestones/Dates/Status

	Scheduled	Actual
Kernels, initial codes in repository	1/12	12/11
Formulation of 1st-year calculation	1/12	1/12
NEK data structures in MOAB	1/12	1/12
Initial performance model for NEK	7/12	-
Initial performance analysis for UNIC	7/12	-
Initial uncertainty quant. runs	7/12	-
Complete pin bundle calculations	10/12	-
Custom viz design for NEK/UNIC output	12/12	-

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