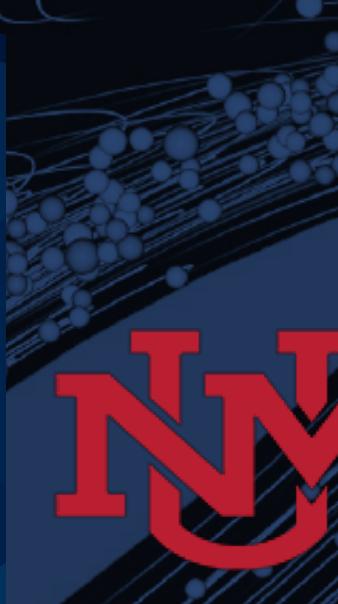


What do I do? Brian MacKie-Mason Postdoc, ALCF

Where have I been?



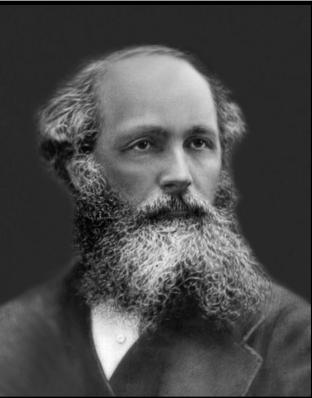
ELECTRICAL
& COMPUTER
ENGINEERING



Computational Electromagnetics



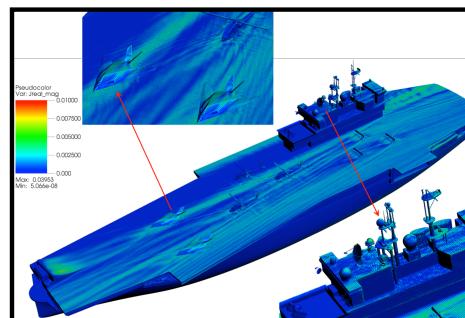
ELECTRICAL
& COMPUTER
ENGINEERING



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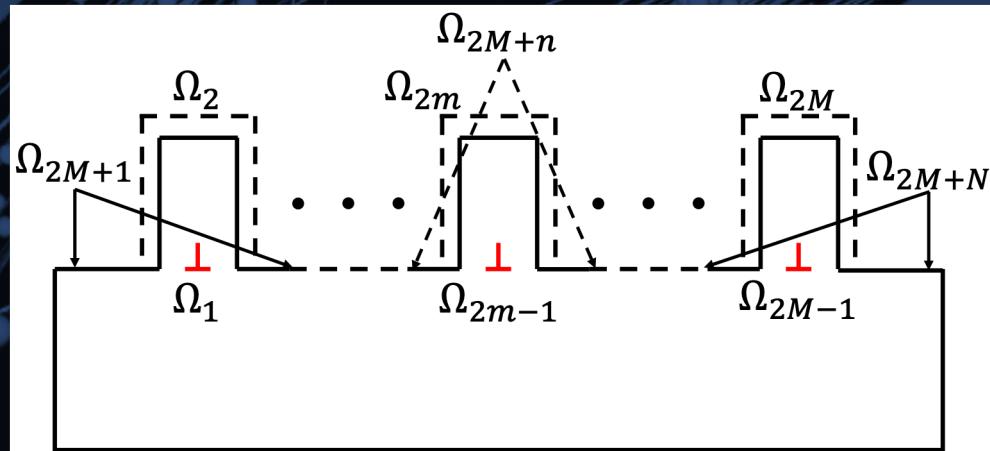
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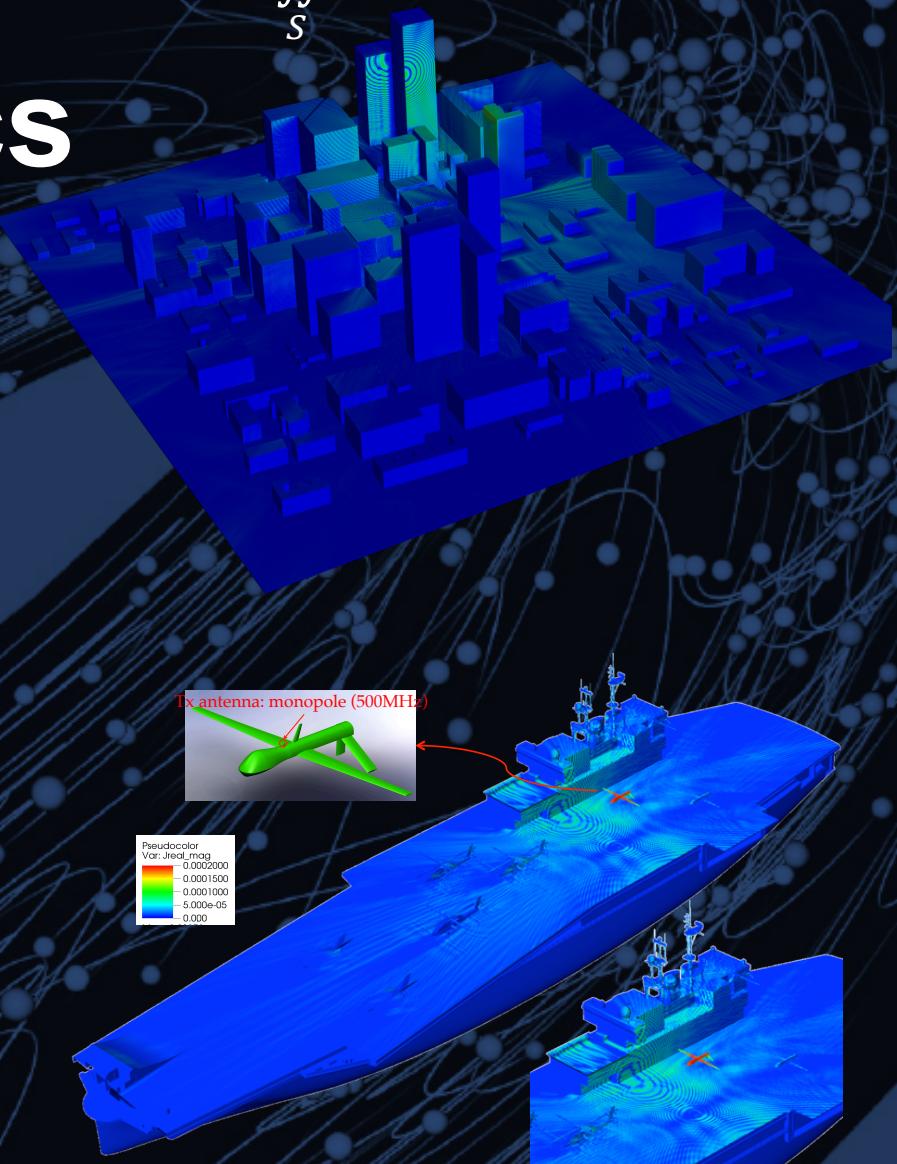
Computational Electromagnetics



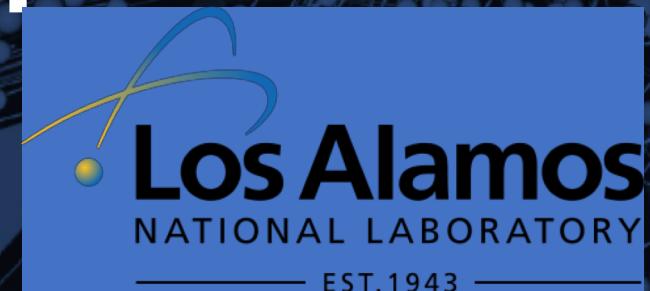
ELECTRICAL
& COMPUTER
ENGINEERING



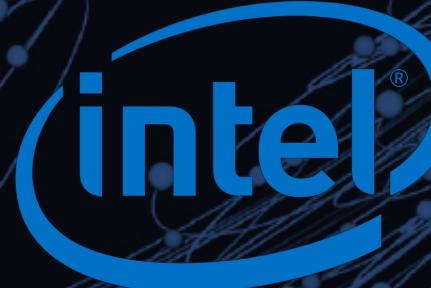
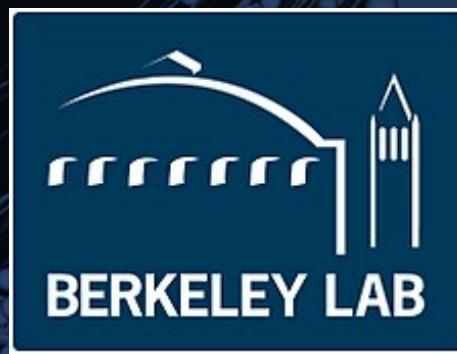
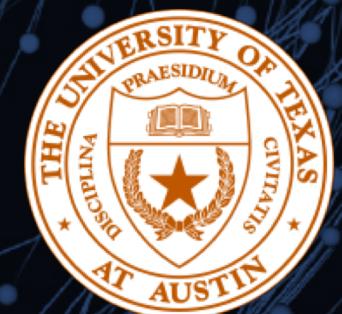
$$E = -i\eta k \iint_S J \cdot G \, dS$$



Computational Magnetic Confinement Fusion



PRINCETON
PLASMA PHYSICS
LABORATORY



Computational Nuclear Fusion

- What is XGC?
 - X-point (cross point) included Gyrokinetic Code
 - Study of edge plasma in Tokamak
 - Huge consumer of compute hours across LCF/NERSC
 - Part of Early Science Program (and most other allocation programs)
- My role:
 - Optimize code for Intel KNL nodes
 - Develop new physics algorithms
 - Study new physical phenomena
 - Prepare XGC for Aurora architecture
- Large team plays a role in success

$$\begin{aligned}\dot{\mathbf{X}} &= \frac{1}{D} \left(\frac{q_s}{m_s} \rho_s \mathbf{B} + \frac{\mathbf{F} \times \mathbf{B}}{B^2} + \frac{q_s}{m_s} \rho_s^2 B \nabla \times \tilde{\mathbf{b}} \right) \\ \dot{\rho}_s &= \frac{\mathbf{F} \cdot \dot{\mathbf{X}}}{B \rho_s} \\ \dot{\mu}_s &= 0\end{aligned}$$

Next Steps

**AURORA
COMING SOON**