

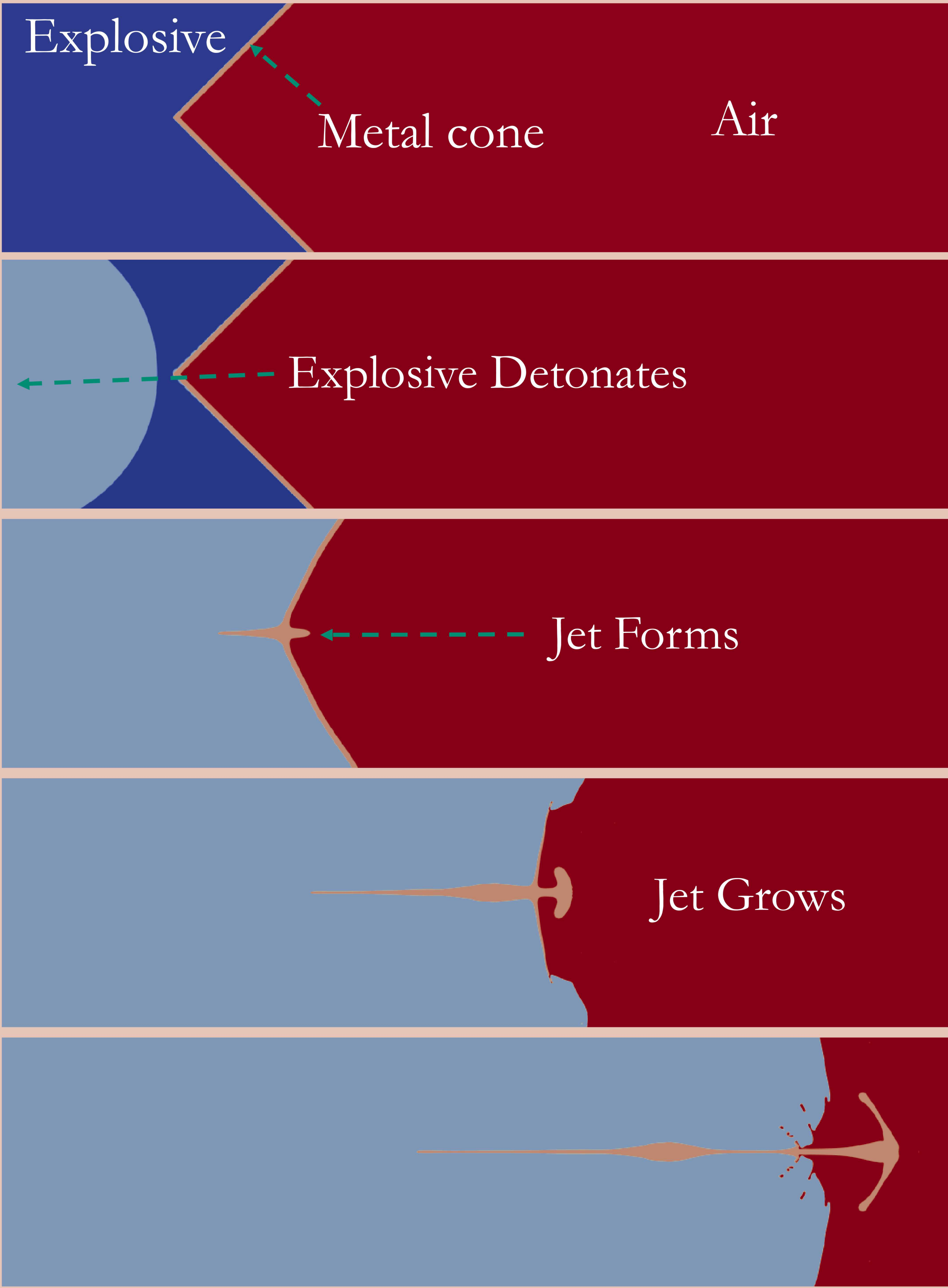
Explosive DGX Performance for Weapon Component Modeling

Shaped charge jets are armor-piercing weapons that use concentrated explosives to shoot a jet of metal at the target.

We have legacy codes that can predict how they work, but these legacy codes take a long time to run.

We rewrote the legacy code and optimized for both CPUs and CUDA GPUs. The optimized code is 22X faster on an NVIDIA Volta GPU than the legacy code on an Intel Xeon processor.

The Simulation: 2D Shaped Charge Jet



Relative Performance Improvement

	16 cores of Intel Xeon	1 Volta GPU of DGX
Legacy code	1.0X	N/A
Next-Gen code	8.6X	22.7X

Details of the next-gen code:

- Simplified algorithm
- Efficient array storage
- Data-Oriented Design
- Reduced precision (single)
- OpenMP for Intel
- Hand-vectorized for Intel
- CUDA for NVIDIA

Details of the simulation:

- 240,000 cells
- 9,000 time steps
- 4 materials
- **One minute** on GPU
- DGX Workstation

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