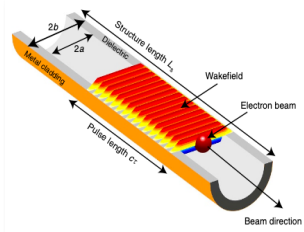
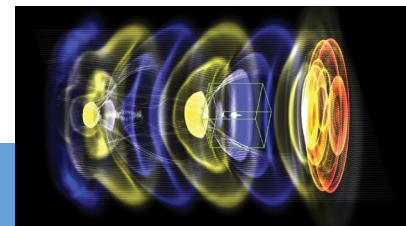
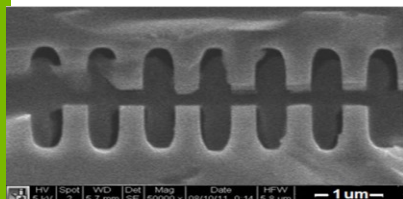
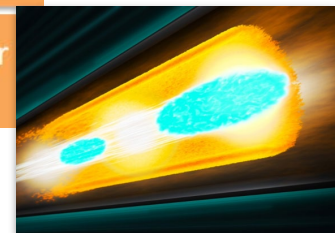


Advanced Accelerator Concepts (AAC) for Future Colliders



Driver	Medium	Structure	Plasma
	Laser Pulse	Dielectric Laser Accelerator DLA	Laser Wakefield Accelerator LWFA
Particle Bunch		Structure Wakefield Accelerator SWFA	Plasma Wakefield Accelerator PWFA



AAC technologies R&D

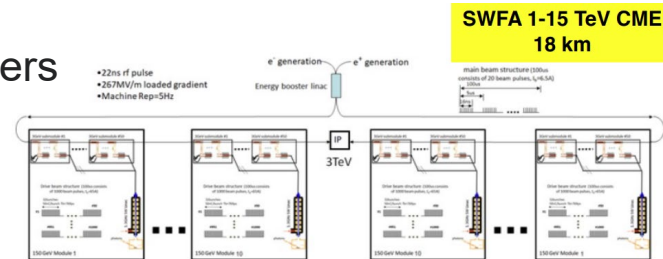
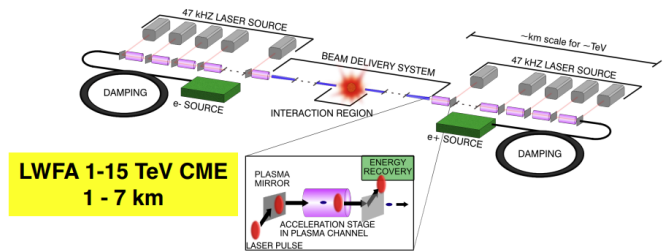
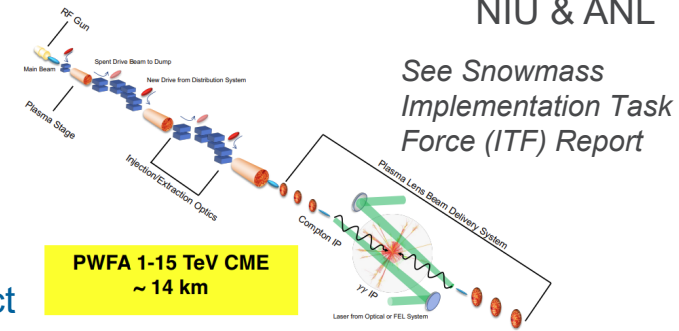
Overarching goal: efficiently harness the interaction of charged particles with extremely high EM fields to reach ultra high acceleration gradients (GeV/m)

High gradient → Compact linear colliders

Towards a 10 TeV lepton collider

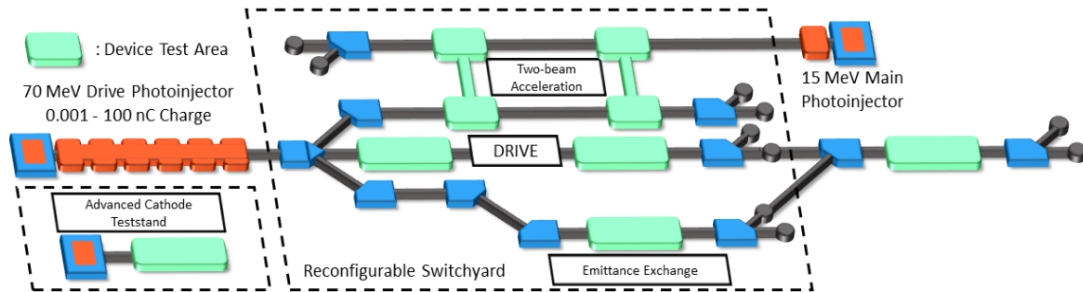
Xueying Lu
NIU & ANL

- AAC is a promising option for a multi-TeV lepton collider
 - Extending the **energy reach** of linear colliders
 - **Compact** enough for a US site
 - Potential reduction in **power consumption** & **environmental impact**
- Rapid progress recently with great scientific visibility
 - High gradient and high power structures
 - Advanced electron sources for bright beam production
 - Bunch shaping for efficiency improvement
 - Multi-GeV acceleration in a single stage
 - Staging, and many more
- Significant development still required for 10 TeV lepton colliders
 - AAC challenges to address: high repetition rate, high wall-plug efficiency, beam emittance preservation over stages, e^+ acc. ...
 - Continued and enhanced R&D, upgrades to US Test Facilities



AAC for workforce of future colliders

- AAC has been building a strong workforce for future colliders
 - Students are being drawn into the field
 - Recent data point: at AAC'22 Workshop, 96 students (37%) out of 258 registrants
 - Unique training opportunities to learn about “the best of both worlds”
- Foster and deepen collaboration between national labs and universities
 - Capitalizing on premier US Beam Test Facilities



Welcome to the Argonne Wakefield Accelerator (AWA)

US center for SWFA research