



## ALEGRO March 2018 WG7 notes

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- Are existing sources capable of meeting DLA collider parameters?
- See if we can do this using conventional SRF injectors
  - Positrons will need damping ring
  - Electrons might need damping ring
- Need to include optical bunch trapping efficiency (~40%) in calculation
- Trade-off: Luminosity scales quadratically in bunch charge but linearly in rep rate
  - Get as much charge optically trapped in each RF bunch as possible
  - Choose rep rate to get required luminosity
- Perform 1–2 year feasibility study, including experts from outside DLA community

DLA Skeptic: “You’ll never get a 10 MW beam in a micron scale aperture!”

Probably wrong, but important

# Focusing and transport

- Will the beam survive ~km of transport in a DLA?
- High priority: How much charge can be transported in a DLA?
- Use wakefield calculations + tracking
- Include focusing scheme with wakefield
  - Includes BBU
- Utilize recently developed 6D tracking code and PIC features

- **Will the beam destroy the dielectric accelerator structures?**
- Tests at 300 MeV and 3 GeV planned for ACHIP
- Need simulations to estimate beam halo
  - Include nonlinear EM forces: included in tracking study
  - Evaluate calculation schemes
- Assess effect of beam loss on structures
  - Study using GEANT4 simulation
  - Heat load
  - Key question: Will there be catastrophic damage? (Or, what's the expected structure lifetime in beam environment?)
  - Might be deciding factor in Si vs. SiO<sub>2</sub> structure
  - Determine potential mitigation strategies

- Can structures be aligned sufficiently for stable beam dynamics?
- Does mechanical vibration pose a problem? Can it be mitigated?
- What are the tolerances for alignment and vibration?
- Small-scale alignment demonstration with active feedback
- LIGO has demonstrated  $< 1 \text{ nm}/\sqrt{\text{Hz}}$  optical stability over  $\sim\text{km}$

# Today's activities

- Continue discussion of collider parameters and trade-offs
- Address WG charges
- Prepare WG summary and ESG report outline