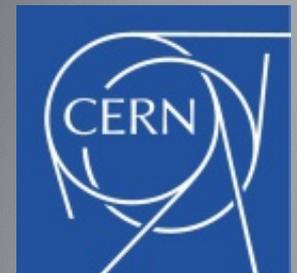
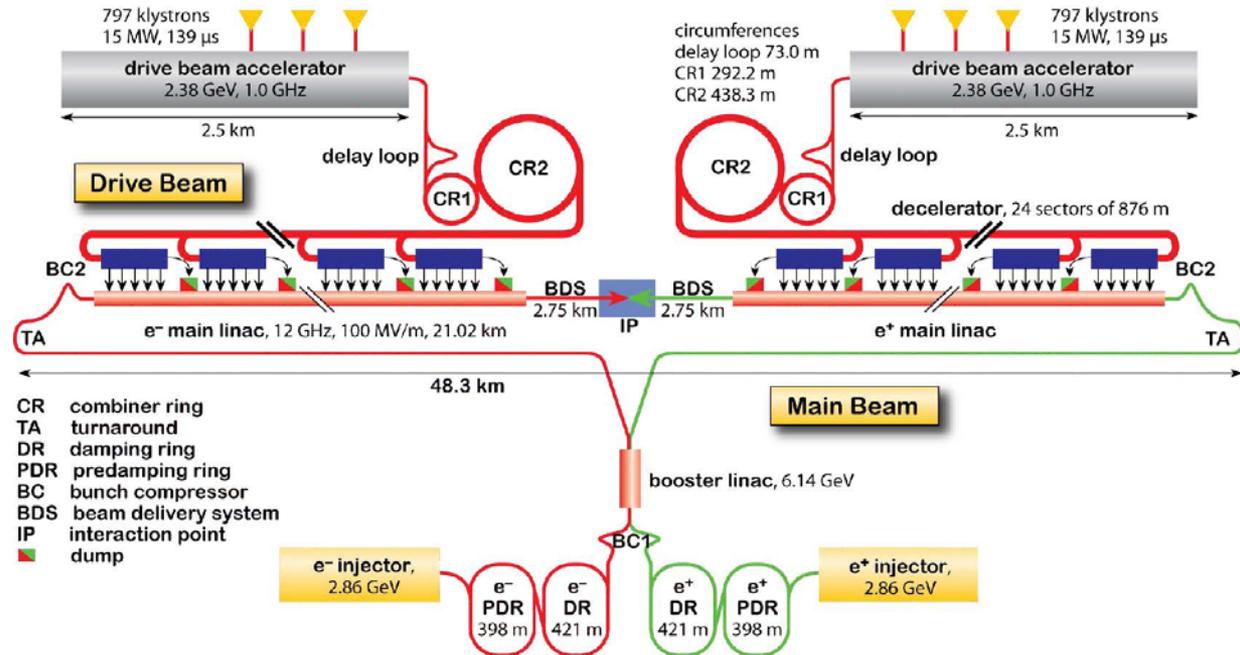


# Effect of Beam-Loading on the Breakdown Rate of High Gradient Accelerating Structures

J.L. Navarro , for the CTF3/CLIC Collaboration



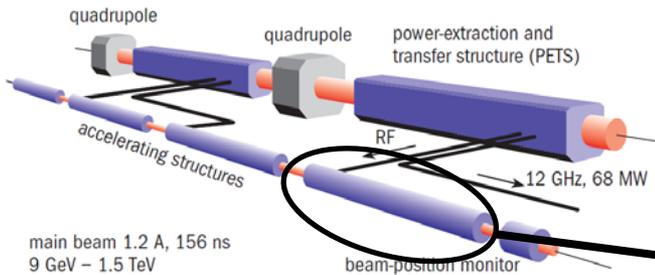
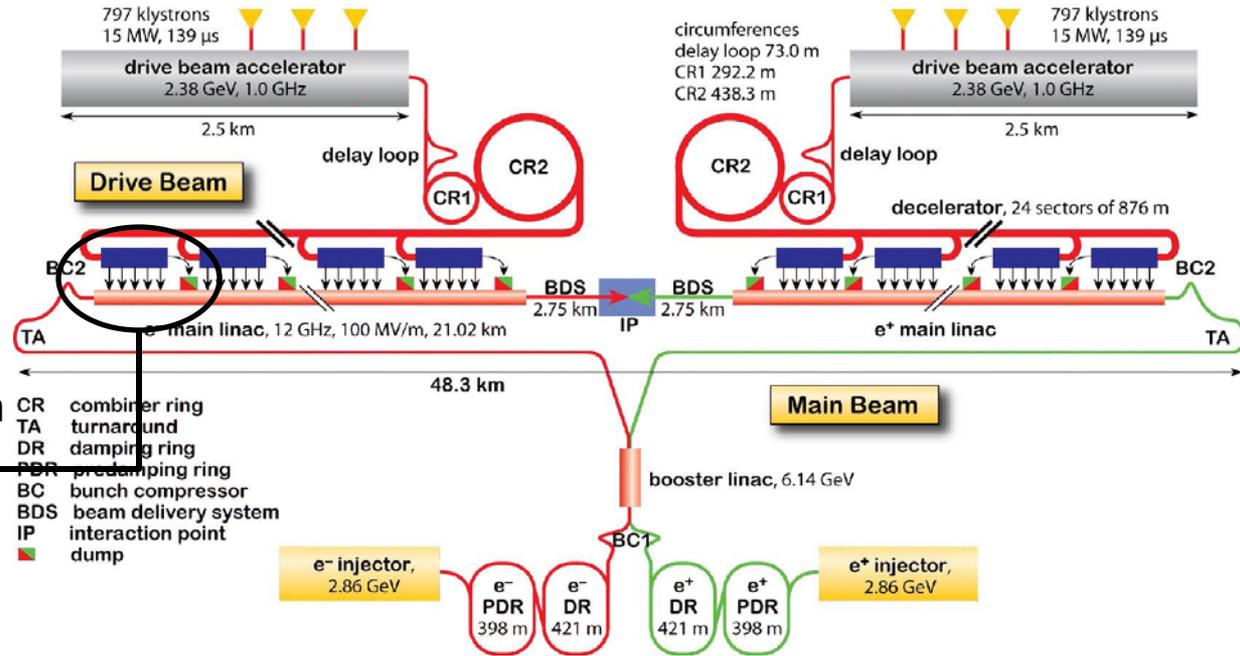
- ✓ The **Compact Linear Collider** (CLIC) aims to collide  $e^- e^+$  at 3 TeV using a new **Two beam Acceleration Concept**



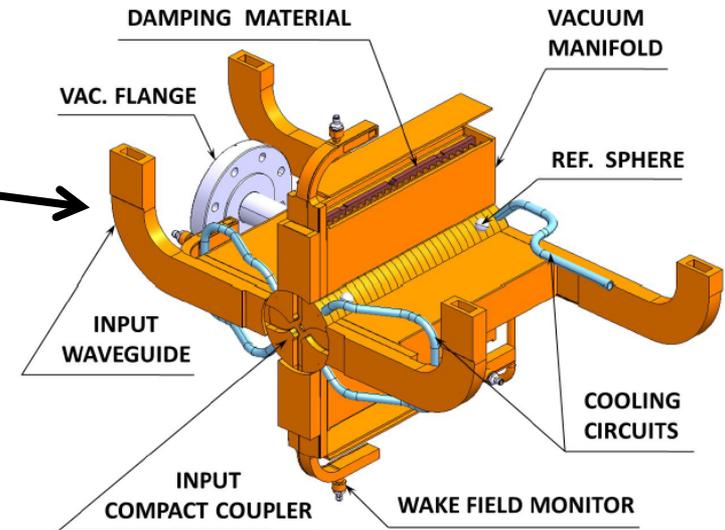


✓ The **Compact Lineal Collider (CLIC)** aims to collide  $e^- e^+$  at 3TeV using a new **Two beam Acceleration Concept**

✓ Energy for the main beam is provided by deceleration of a high current “drive beam”



- **Traveling waves** cavities
- Nominal gradient  $\sim 100$  MV/m
- Nominal RF pulse length  $\sim 240$  ns
- Peak Power  $\sim 61$  MW
- Max. Surf. Field  $\sim 230$  MV/m



CLIC works with **strong accelerating fields** ( $\sim 100$  MV/m)

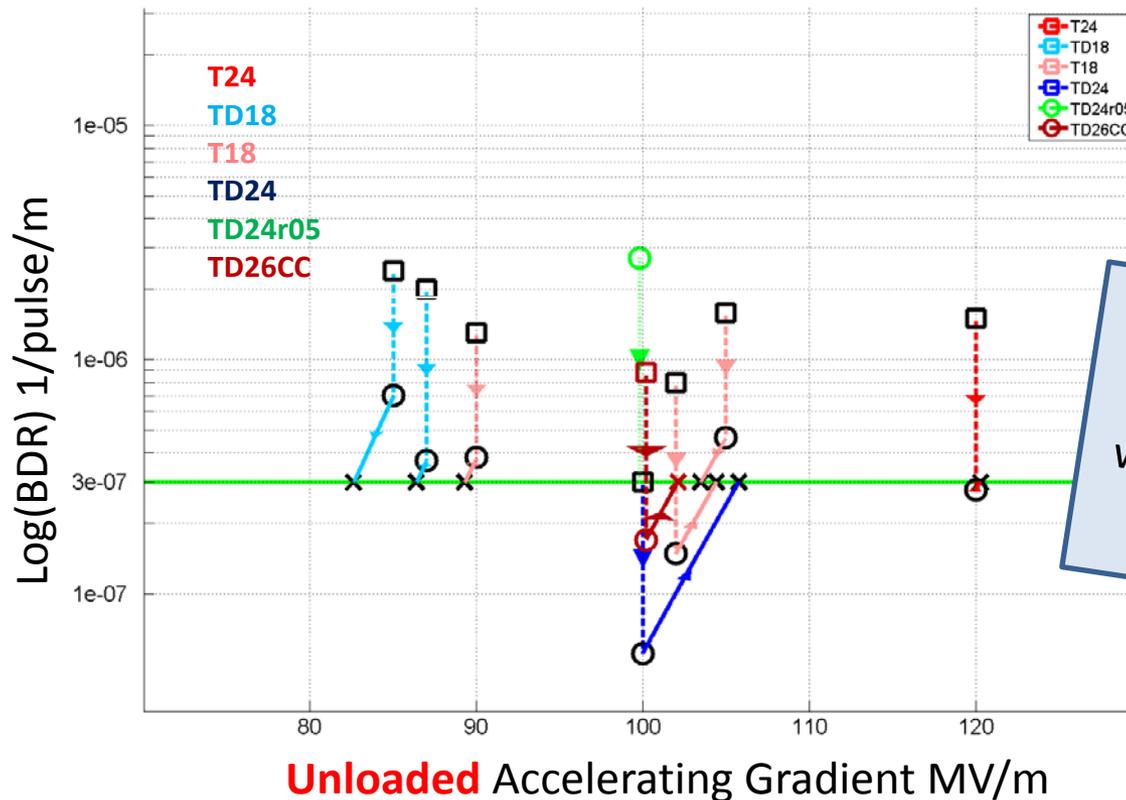
**Problem of Break Downs (BD):** Very fast (10 ns – 100 ns) and localized dissipation of stored energy in the structure with undesired effects:

- Loss of acceleration
- Damage in the structure
- Kick in the beam
- Luminosity Reduction **Max DB rate allow for CLIC ( $3 \cdot 10^{-7}$  BD pulse $^{-1}$  m $^{-1}$ )**

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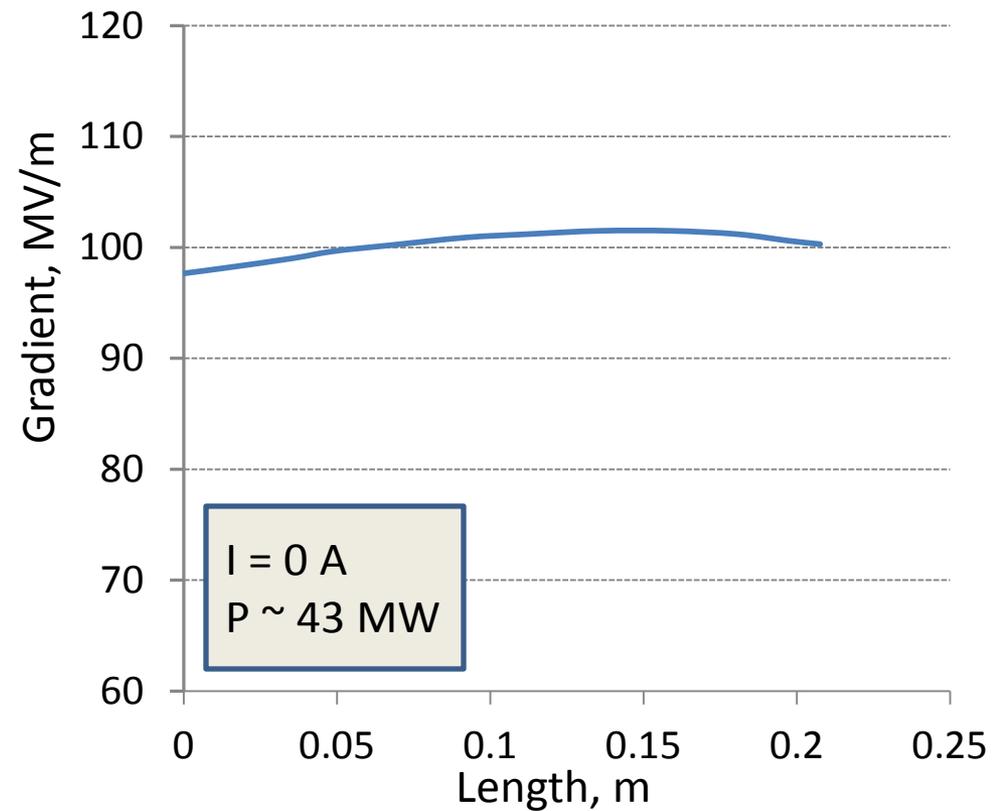
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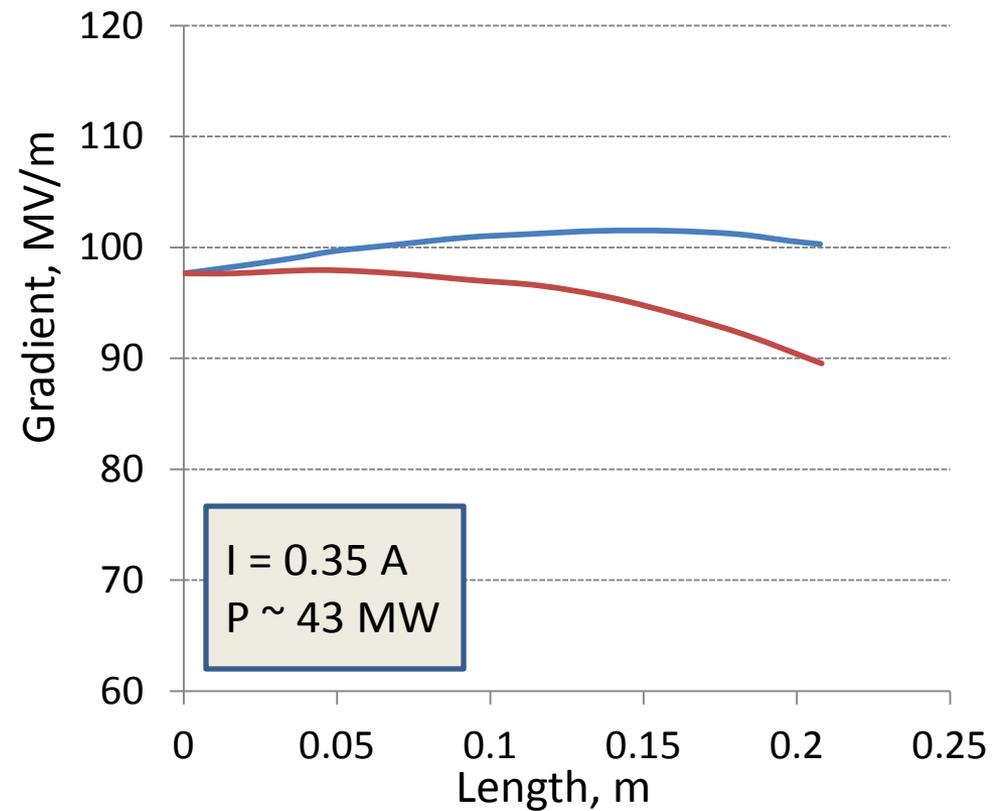


Nominal BD rate  
already achieved  
without beam loading

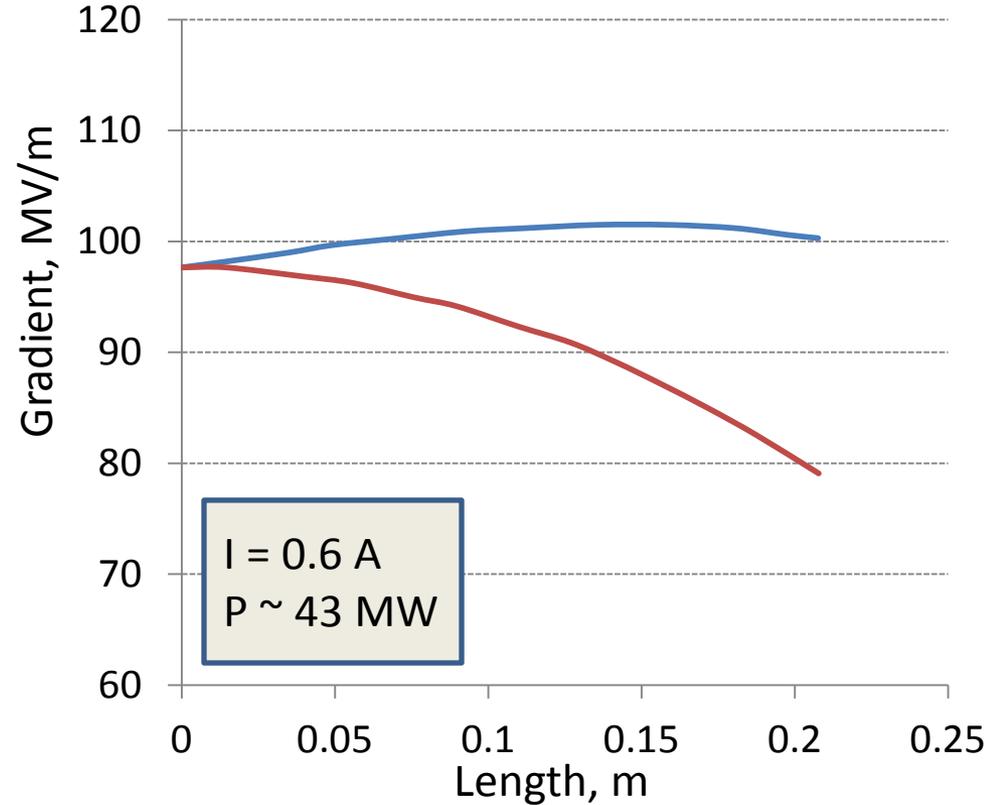
Beam Loading modifies the gradient distribution along the structure



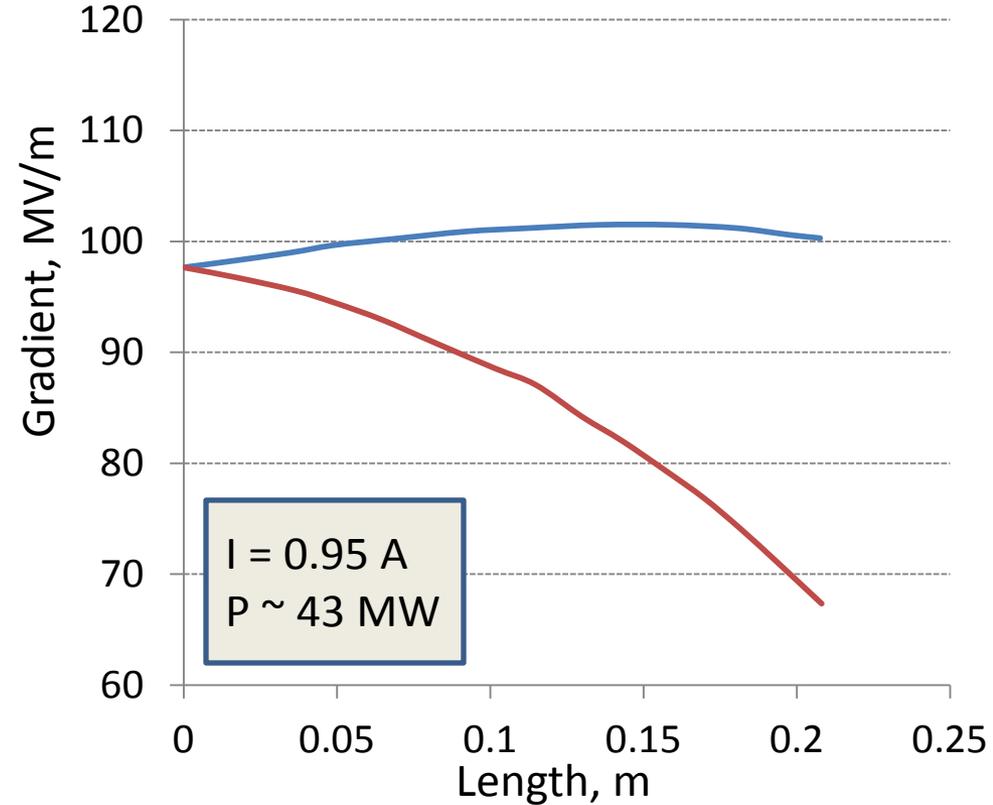
Beam Loading modifies the gradient distribution along the structure



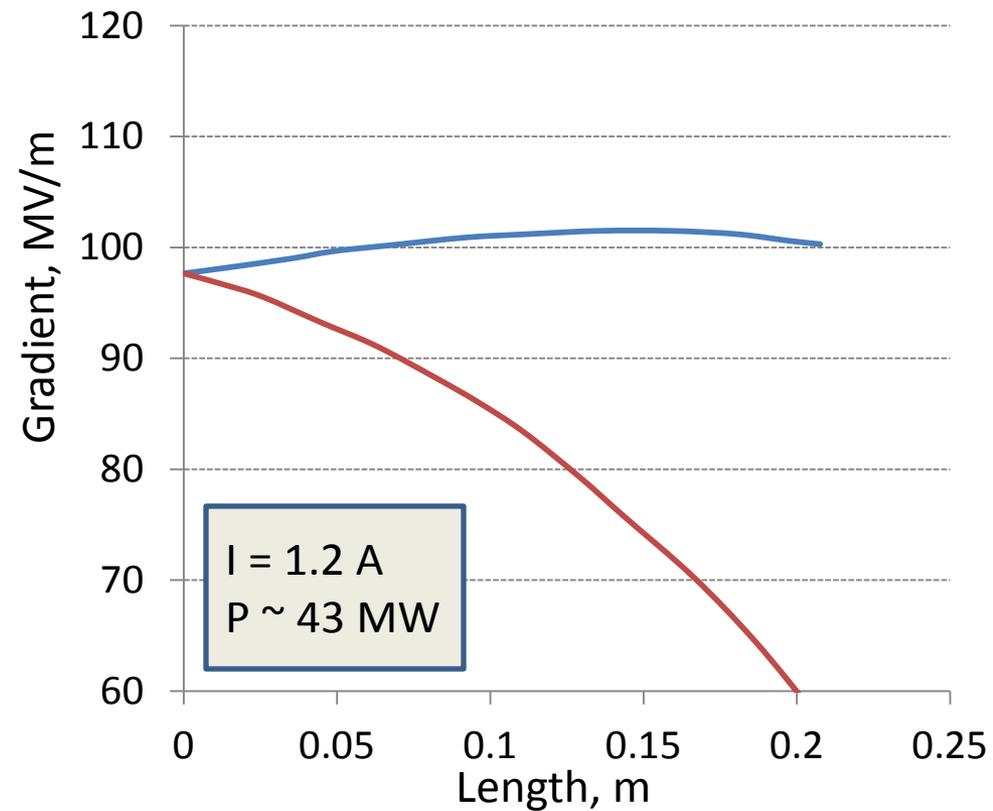
Beam Loading modifies the gradient distribution along the structure



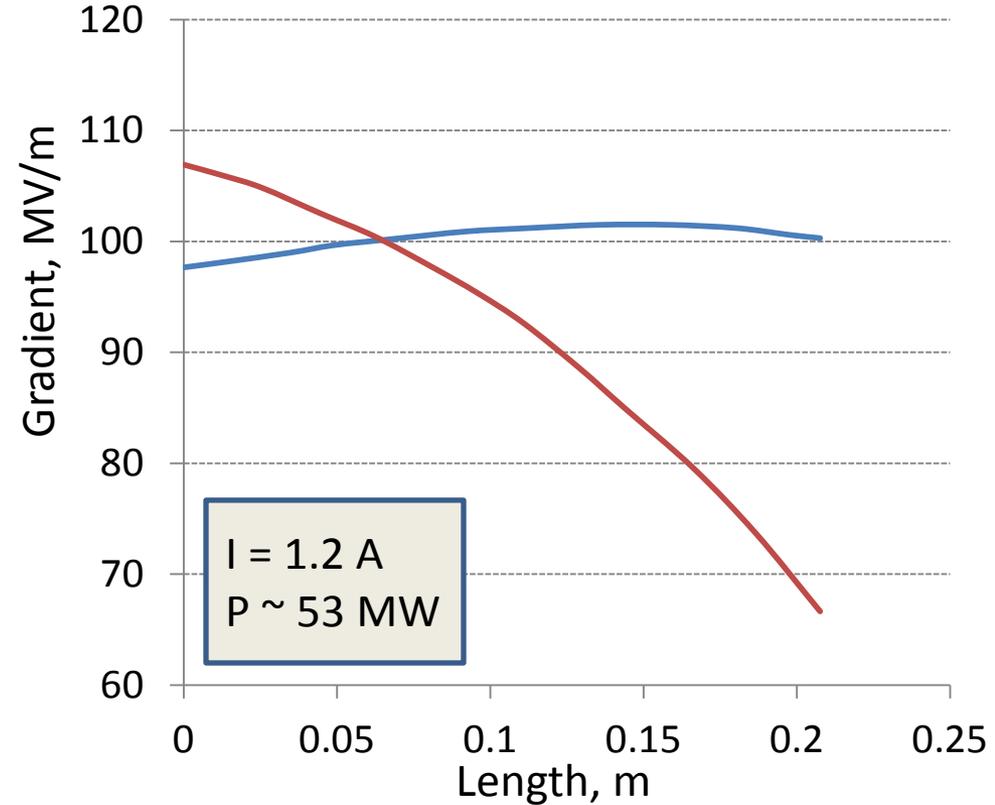
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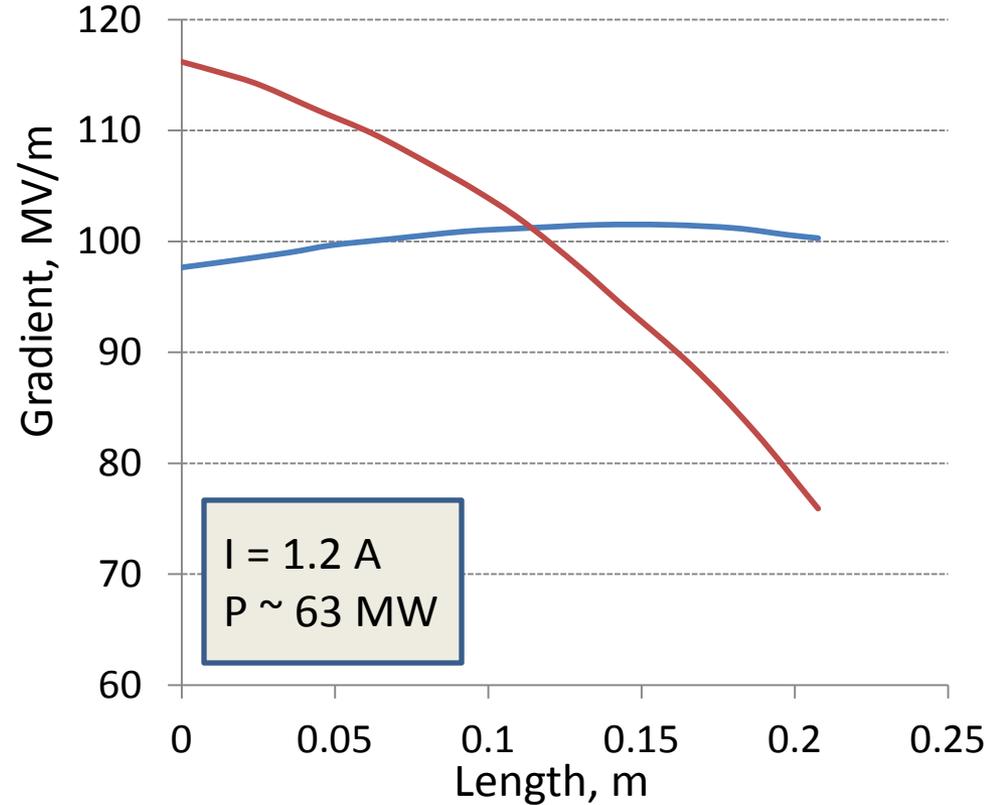


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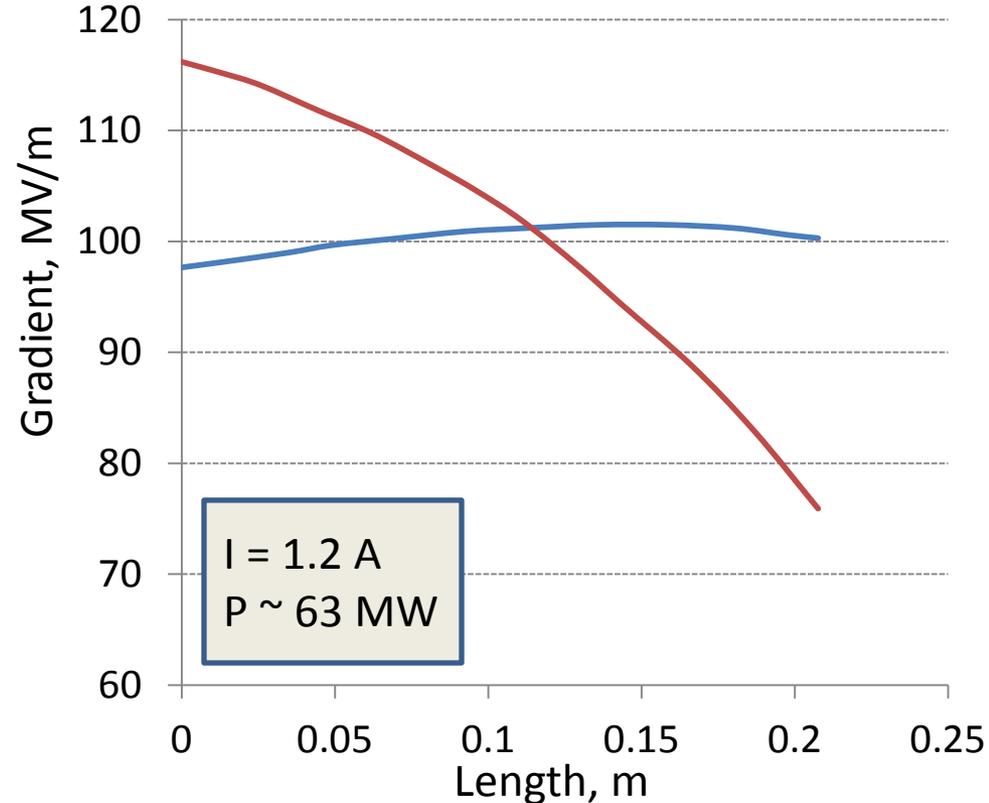
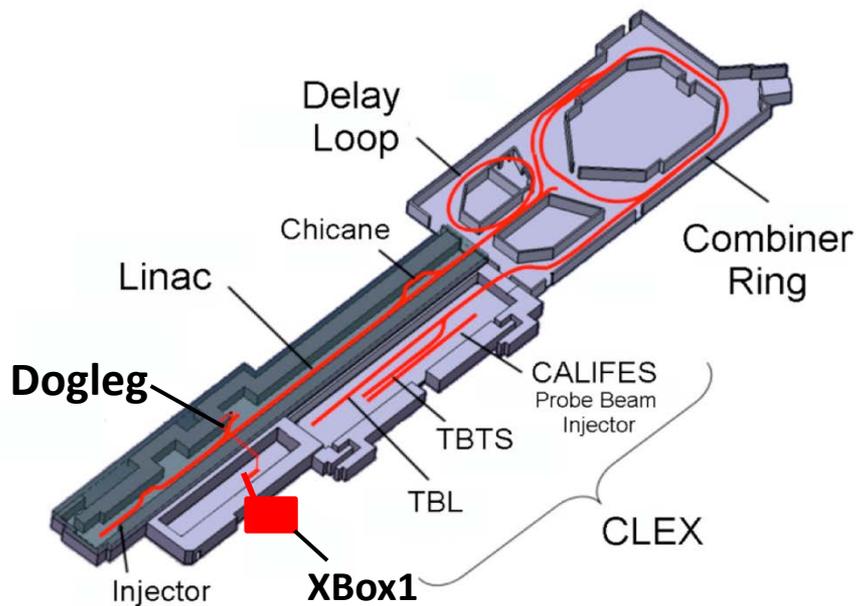
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Unpredicted effect on Breakdown rate



Beam Loading modifies the gradient distribution along the structure

Unpredicted effect on Breakdown rate



Experiment located in the Dogleg Line of the CLIC Test Facility (CTF3)

We test the **effect of beam loading on the Breakdown Rate**

Visit **TUPP028** to learn for CTF3 activities

