X-Ray Rates in Scintillating Fibers near High-Gradient RF Cavities at BNL and FNAL

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• Bicron BCF-12 1-mm-diameter scintillating fibers placed near 2 rf cavities at BNL and FNAL experienced overwhelming rates of x-rays.

• BNL: 2856 MHz, 110 MV/m, ⇒ 1000 MIPS per 10 ns.

• FNAL Lab G: 805 MHz, 13 MV/m, ⇒ 25,000 MIPS per 10 ns.

• The x-ray rate varied as $E^{10.8}$ in both cavities.

• ⇒ Cannot do single particle diagnostics near such cavities unless the electric field is reduced, or the cavities are subject to successful surface treatment.
BNL ATF RF Gun

![Diagram of BNL ATF RF Gun components]

- RF Gun
- Waveguide
- Gate Valve
- Phosphorous Screen
- Optical Transition Radiation (OTR)
- Emittance Compensation Magnet
- Bucking Magnet
- Laser Port
- Fiber 1
- Fiber 2

**グラフ**

- **PMT signal (mV)**
  - 0
  - 300
  - 600
  - 900
  - 1200
  - 1500

- **E (MV/m)**
  - 70
  - 80
  - 90
  - 100
  - 110

**Fit**: $\propto E^{10.8}$

Data
Lab G rf cavity, June 21, 2001
PMT HV = 860 V

Fit: $E^{10.8}$

Lab G rf cavity, 6.0 MW
PMT HV = 860 V