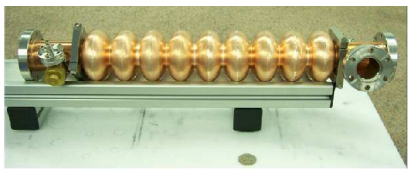
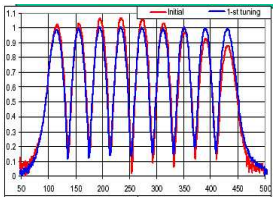
Status of the FNPL injector upgrade

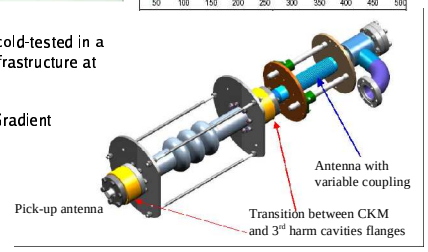
- **L-band accelerator test facilities at FNAL (Fermilab/NICADD) for benchmarking numerical model used to simulate the dynamics of high brightness beam**

- **On-going R&D on 3.9 Ghz accelerating structure at FNAL:**
  - a copper model has been produced
  - field measurements have been performed (both accelerating field and HOM fields)
  - a Niobium model is under realization and the design of a single cavity cryomodule for installation and test at A0 in in progress

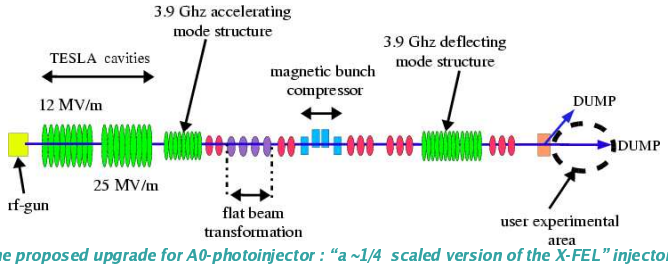




  - 3-cell prototype cavity will will be cold-tested in a vertical cryostat of the 3.9 Ghz infrastructure at FNAL. The goals are:
    - *Q* vs accelerating gradient,
    - Maximum achievable acc. Gradient
    - Lorentz force detuning



- **Upgrade of the A0-photoinjector to include a high-gradient TESLA cavity, a 3.9 Ghz accelerating cavity and a deflecting cavity will provide a unique facility (within approximately one year from now) to study:**
  - time-dependence (within the bunch) of the beam parameters,
  - gain experience with simultaneous operation of rf-systems at 1.3 and 3.9 GHz,
  - characterize and optimize the longitudinal phase space correction process,



The proposed upgrade for A0-photoinjector : "a ~1/4 scaled version of the X-FEL" injector