# X-Band Traveling Wave Deflecting Mode Cavity

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ATF Users Meeting

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Motivation

- X-band deflecting cavity offers unique longitudinal diagnostic capabilities

- Important features:
  - excellent temporal resolution
  - single-shot measurements
  - no pre-assumptions about the beam current profile
  - directly map the electron beam longitudinal phase-space
  - more reliable than other methods

$\Delta t_{FWHM} = 10$ fsec

DEFLECTOR   DIPOLE   SCREEN

x (long. Pos.)

y ($\Delta E/E$)
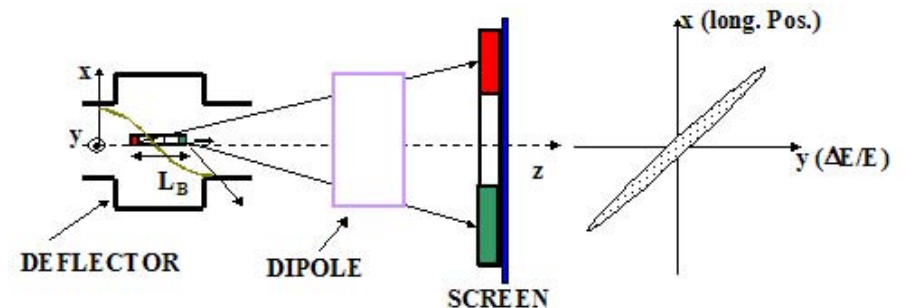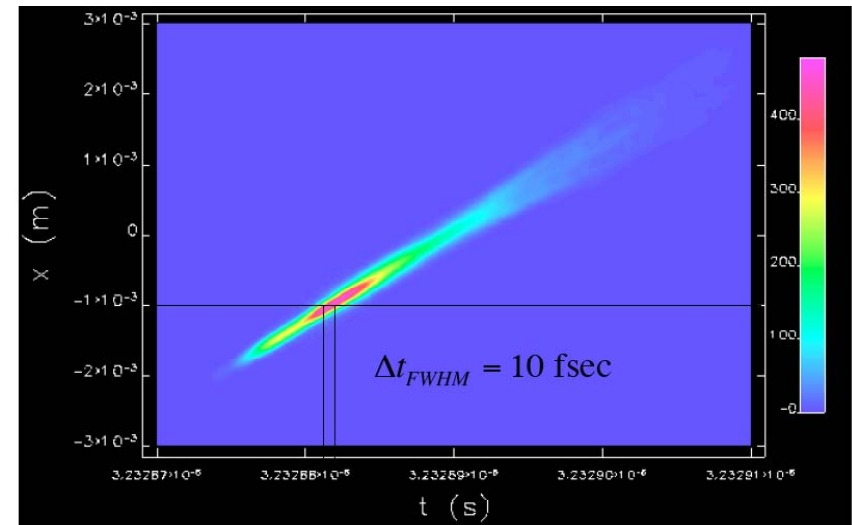
Timeline

2005 – Phase I DOE SBIR award

2006 – RF design, cold test and Phase II DOE SBIR award

2007 – 1st prototype built (after QA decided to fabricate in house)

2008 – fabrication studies at RadiaBeam

2009 – CNC upgrade, process development

2010 – 2nd prototype built (bead pull had 15 MHz red shift)
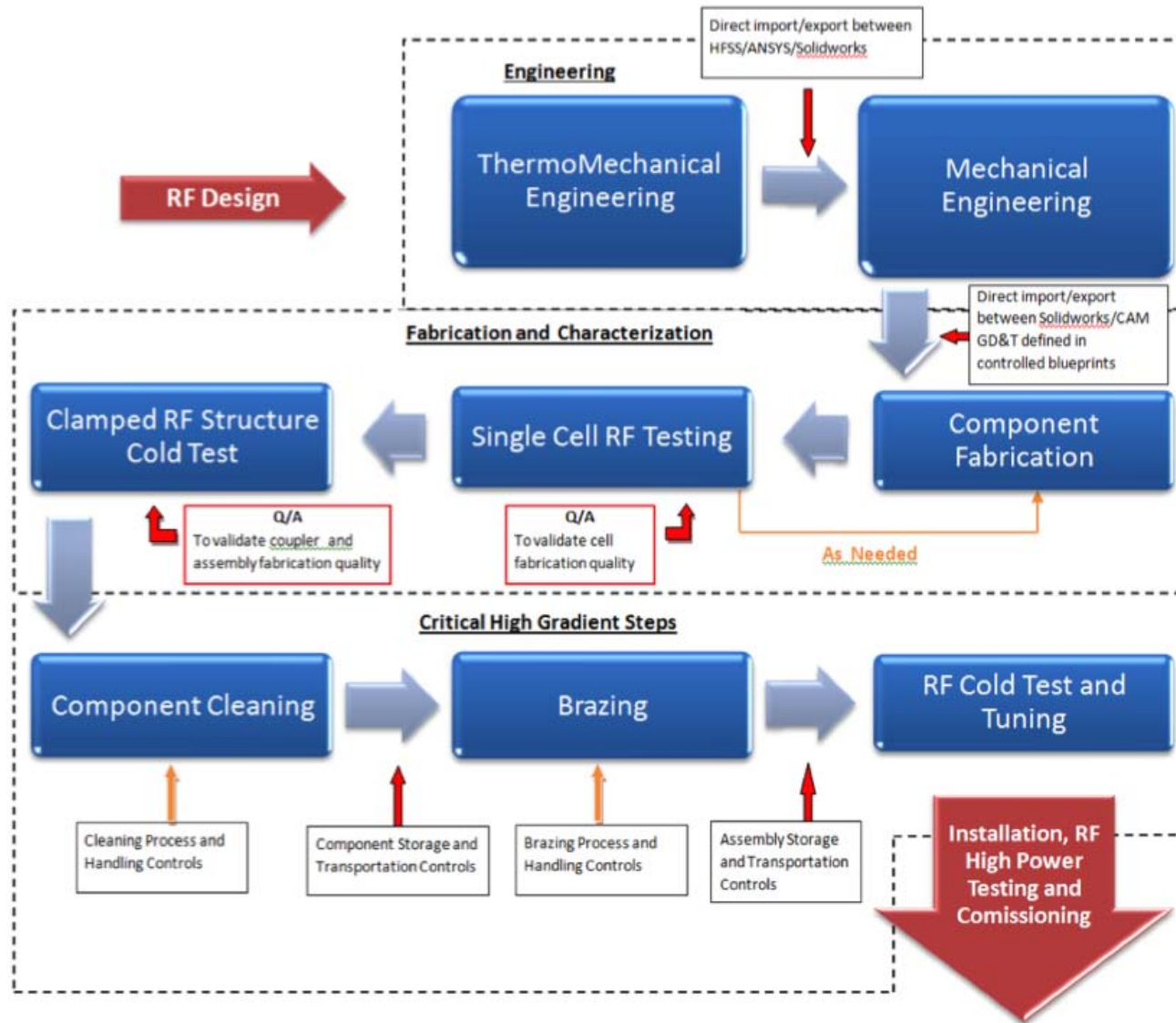
2011 – final prototype fabrication

2012 – brazing, tuning and delivery to ATF

R. Agustsson, S. Boucher, L. Faillace, P. Frigola, S. Storms (**RadiaBeam**)

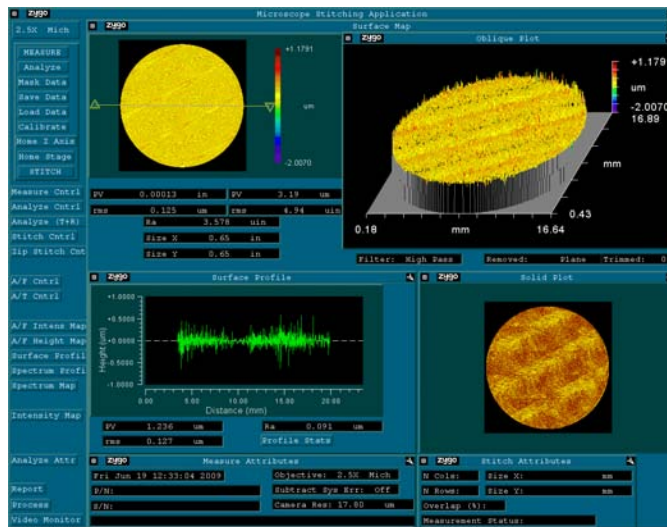J. Rosenzweig (**UCLA**), D. Alesini (**INFN**)

J. England, V. Dolgashev (**SLAC**), V. Yakimenko (**BNL**)
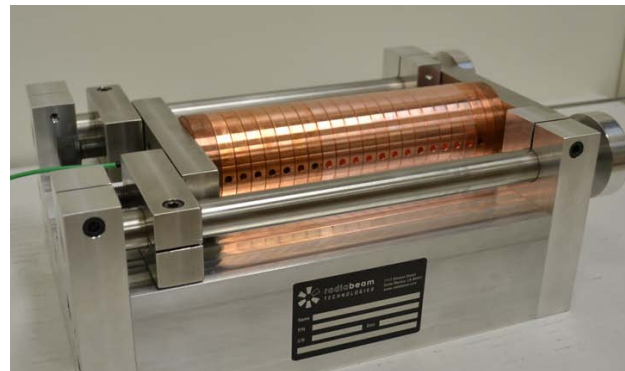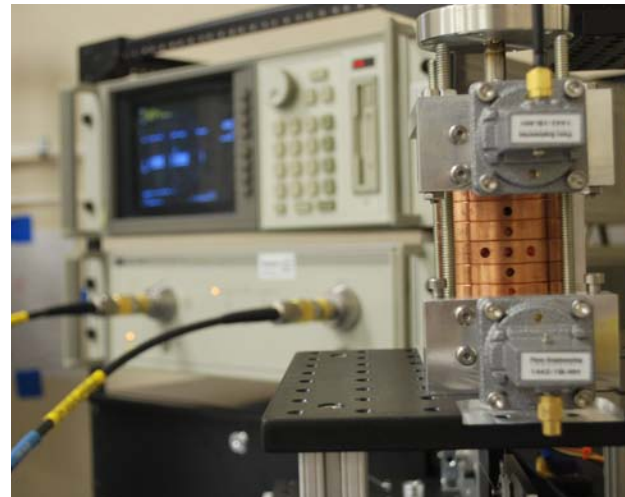
Production Process

Fabrication

- Cell Machining with Haas SL-10 Lathe

- 4-6 micro-inch finished achieved

- 0.0002" accuracies achieved
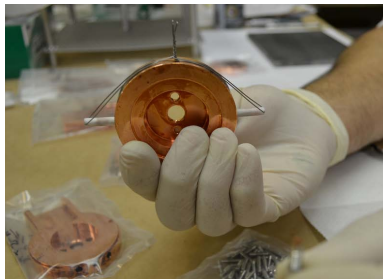
RF measurements and cells sorting

- Single cell, stacked cells, bead pull and cold test

Cleaning and assembly

- Adopted SLAC etching procedure
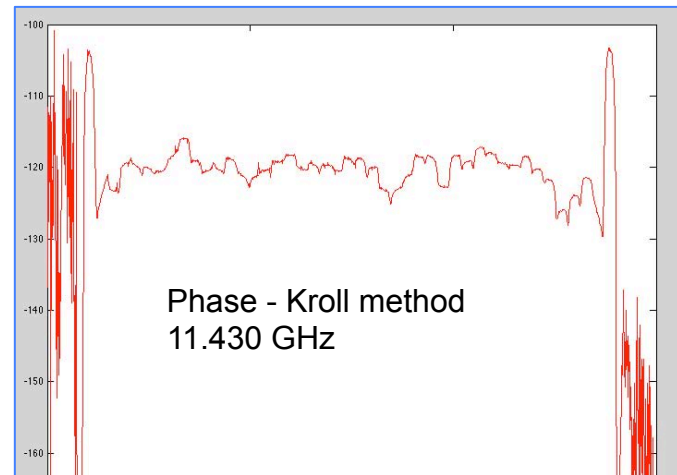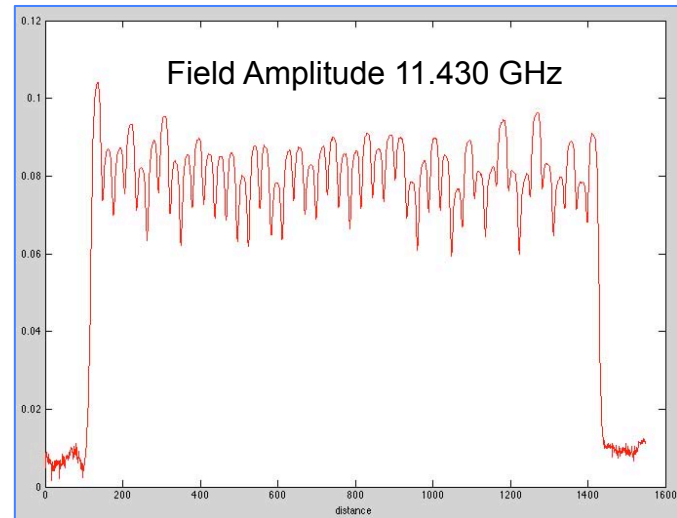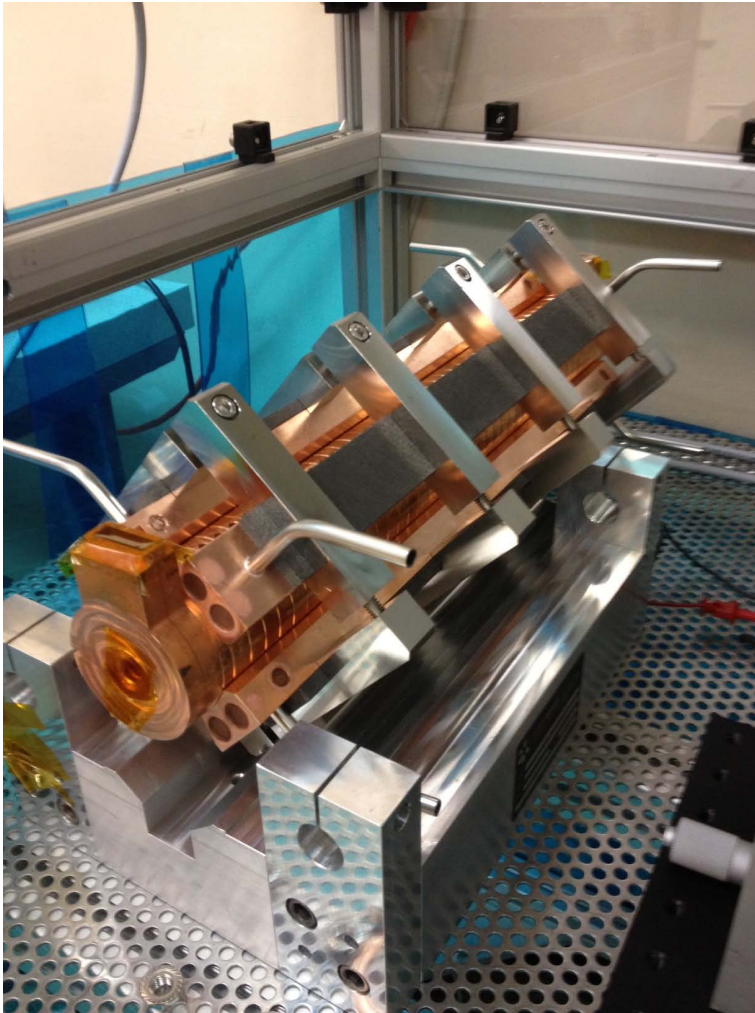- Class 100 clean room assembly

Brazing

- Structure brazing completed in March-2012

QA and final testing

- Vacuum test and final bead pull of the brazed structure are successful

Field Amplitude 11.430 GHz

Phase - Kroll method
11.430 GHz

Future steps

- Tuning at SLAC (preliminary around the 2nd week of May)

- Delivery to ATF (~ June 1st)

- Commissioning will be performed by UCLA

- CSR-induced phase space fragmentation experiment?
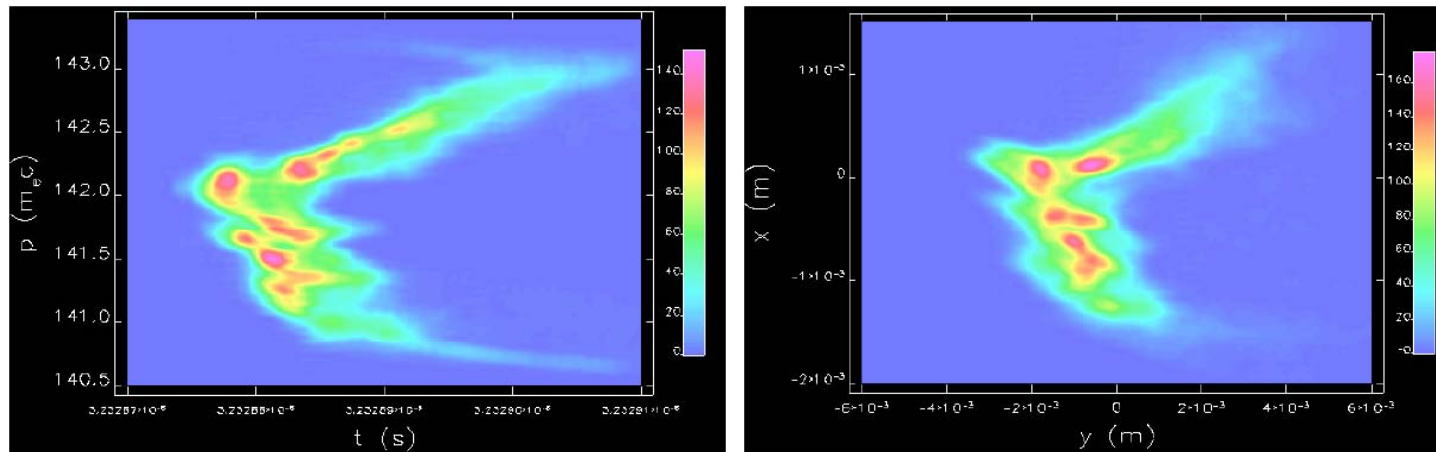
- Attoscope (G. Andonian presentation)

Acknowledgement