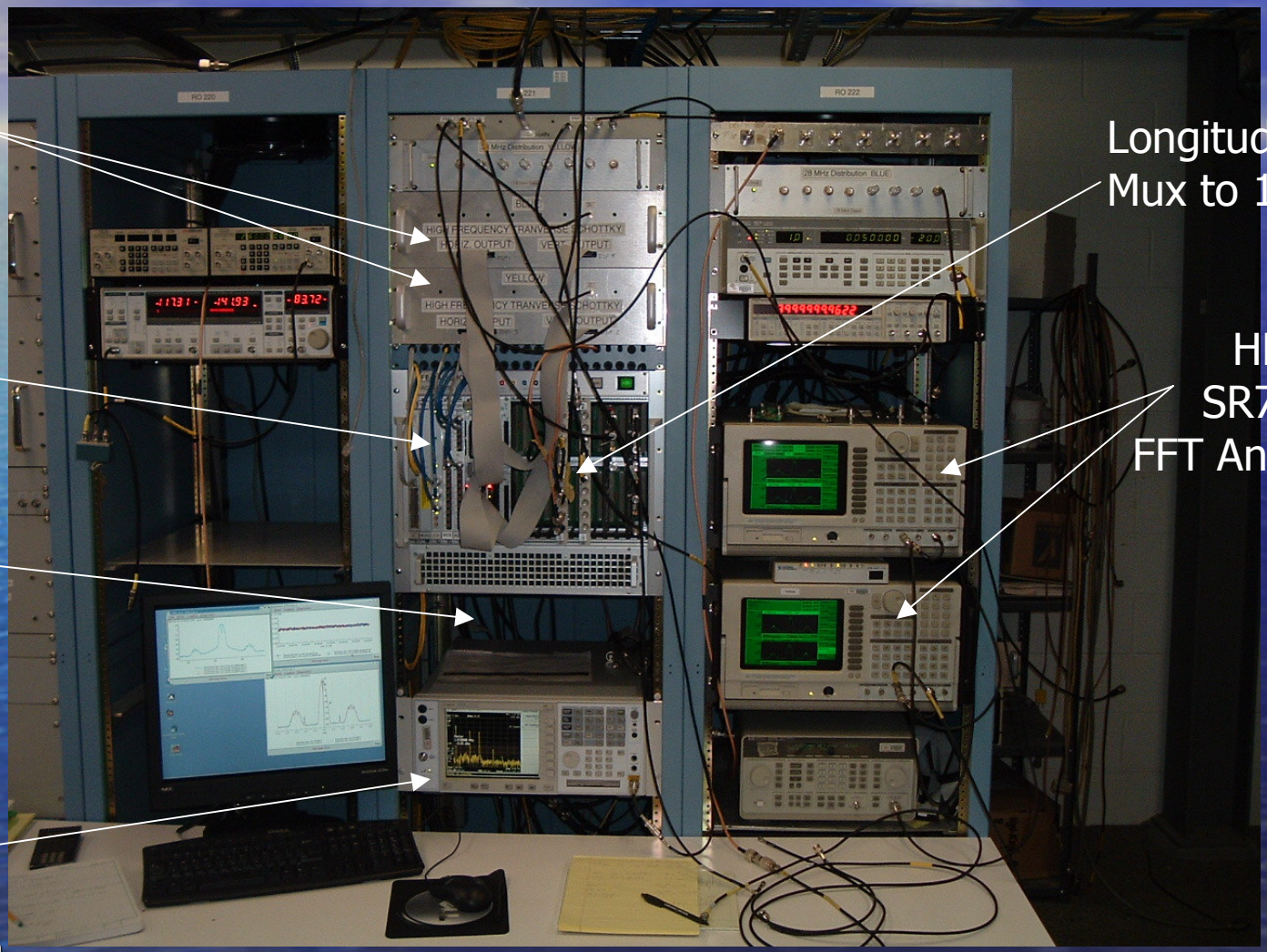
# Schottky

- Hardware Overview (Significant Changes this year)
- High Frequency Schottky Beam Experiments
- Low Frequency Schottky Plans

# Schottky Hardware (1004)



LFS BaseBand Processing

C6711 DSP's

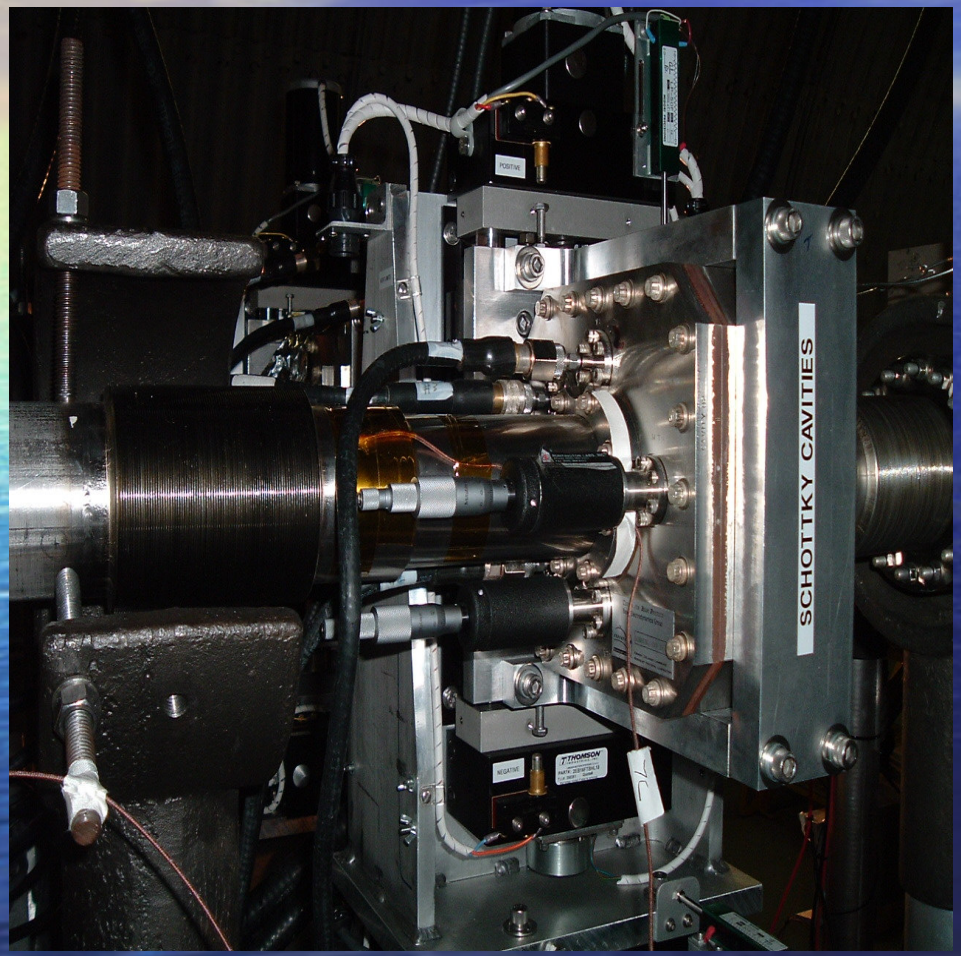
LFS Tracking Receiver

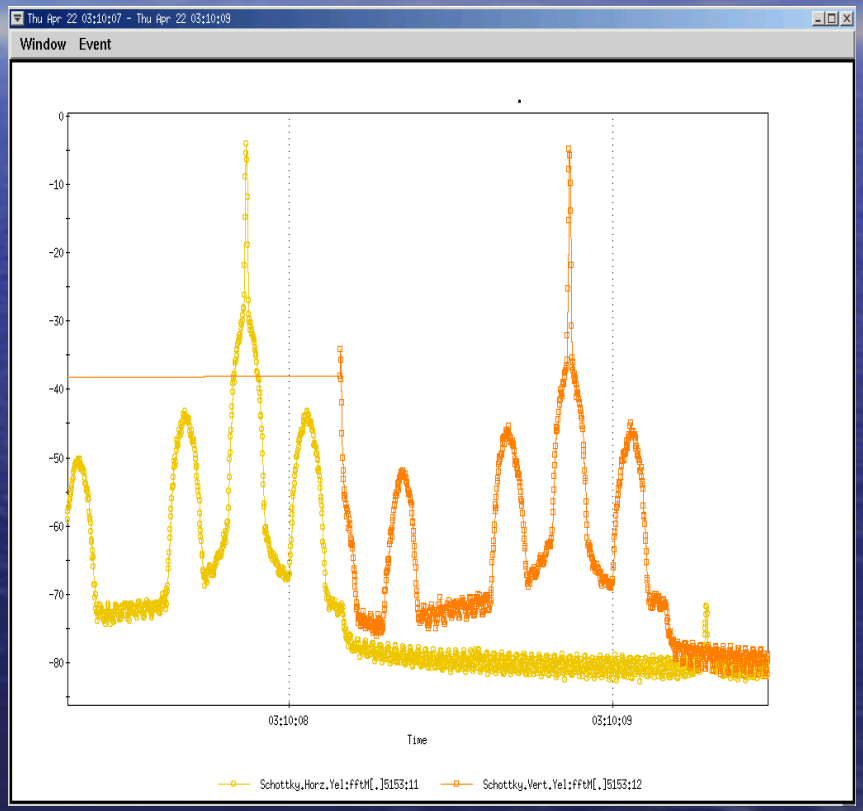
Networked Spectrum Analyzer

Longitudinal HFS Mux to 1004

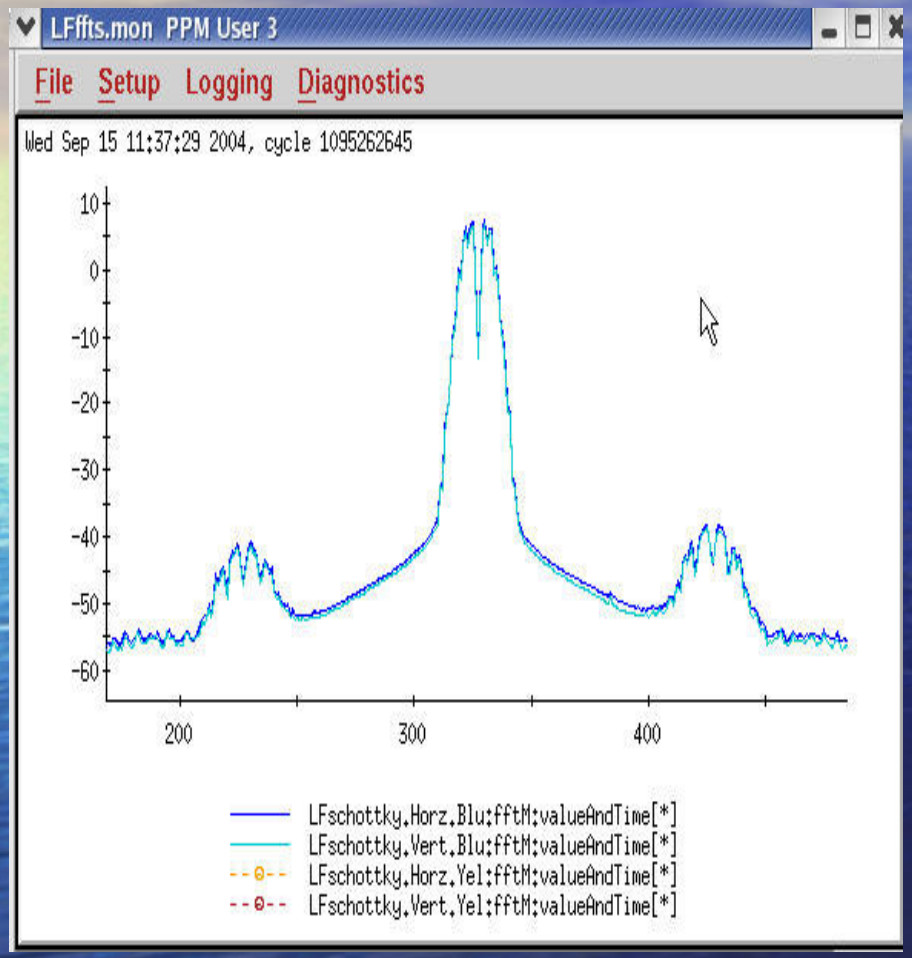
HFS SR785 FFT Analyzer's

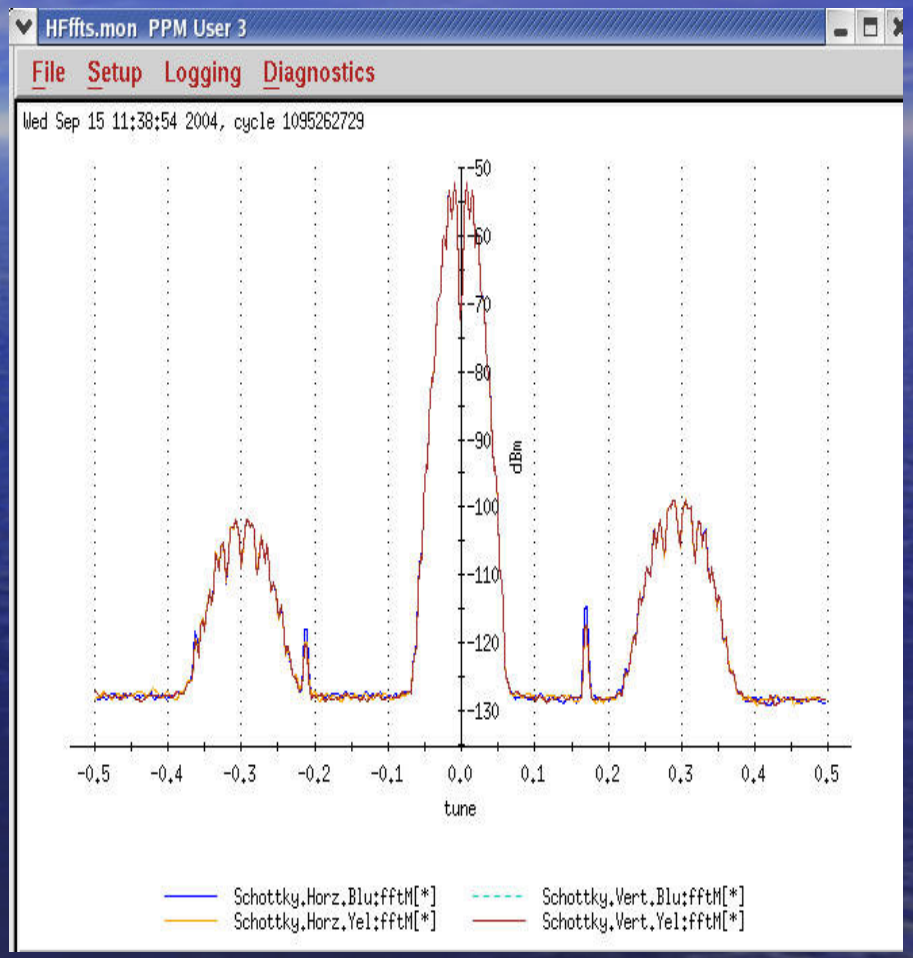
# HF Schottky Motion Control



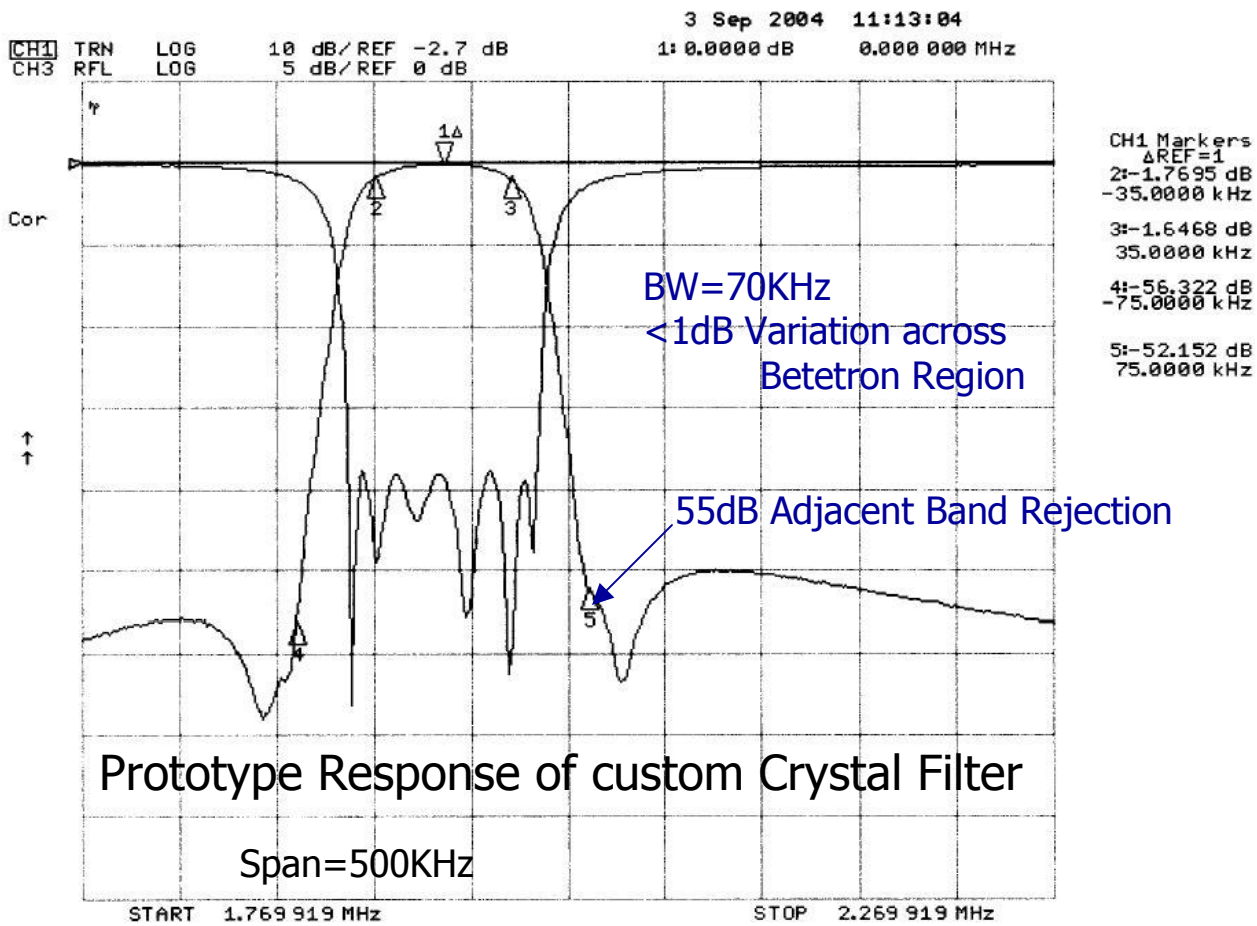



# DSP vs SR785


LFffts.mon PPM User 3
File Setup Logging Diagnostics
Wed Sep 15 11:37:29 2004, cycle 1095262645
10
0
-10
-20
-30
-40
-50
-60
200
300
400
LFschottky.Horz.Blu:fftM:valueAndTime[*]
LFschottky.Vert.Blu:fftM:valueAndTime[*]
LFschottky.Horz.Yel:fftM:valueAndTime[*]
LFschottky.Vert.Yel:fftM:valueAndTime[*]

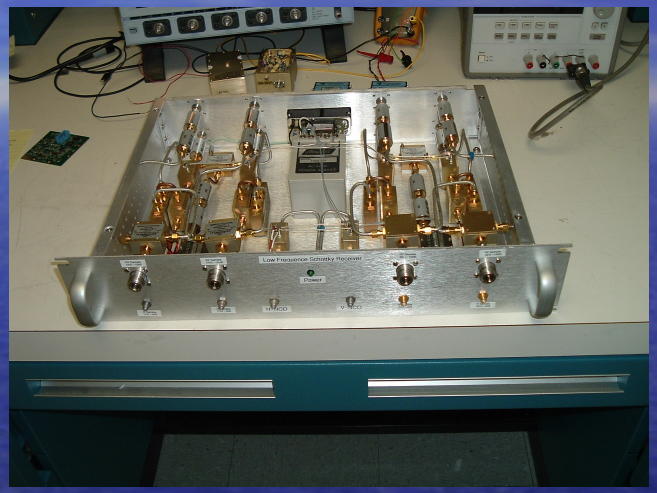

HFffts.mon PPM User 3
File Setup Logging Diagnostics
Wed Sep 15 11:38:54 2004, cycle 1095262729
-50
-60
-70
-80
-90
-100
-110
-120
-130
dBm
-0.5
-0.4
-0.3
-0.2
-0.1
0.0
0.1
0.2
0.3
0.4
0.5
tune
Schottky.Horz.Blu:fftM[*]
Schottky.Horz.Yel:fftM[*]
Schottky.Vert.Blu:fftM[*]
Schottky.Vert.Yel:fftM[*]

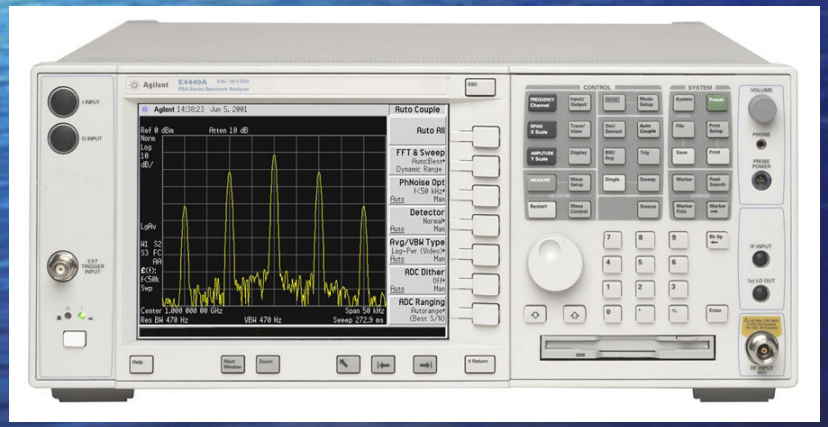
# HF Schottky 2nd-IF (2MHz) Filter

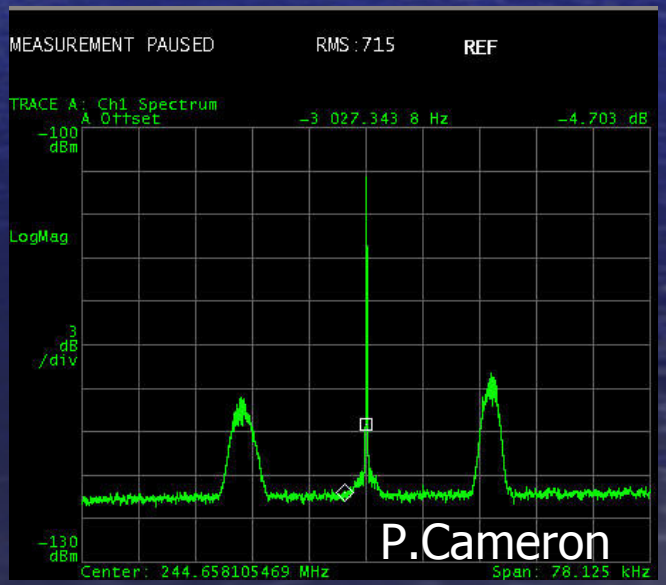


# LF Schottky

- New 245MHz Receiver
- Develop Ramp Diagnostics using DSP during run
- Use E4445A Spectrum Analyzer in Parallel. Data will be available to Control System





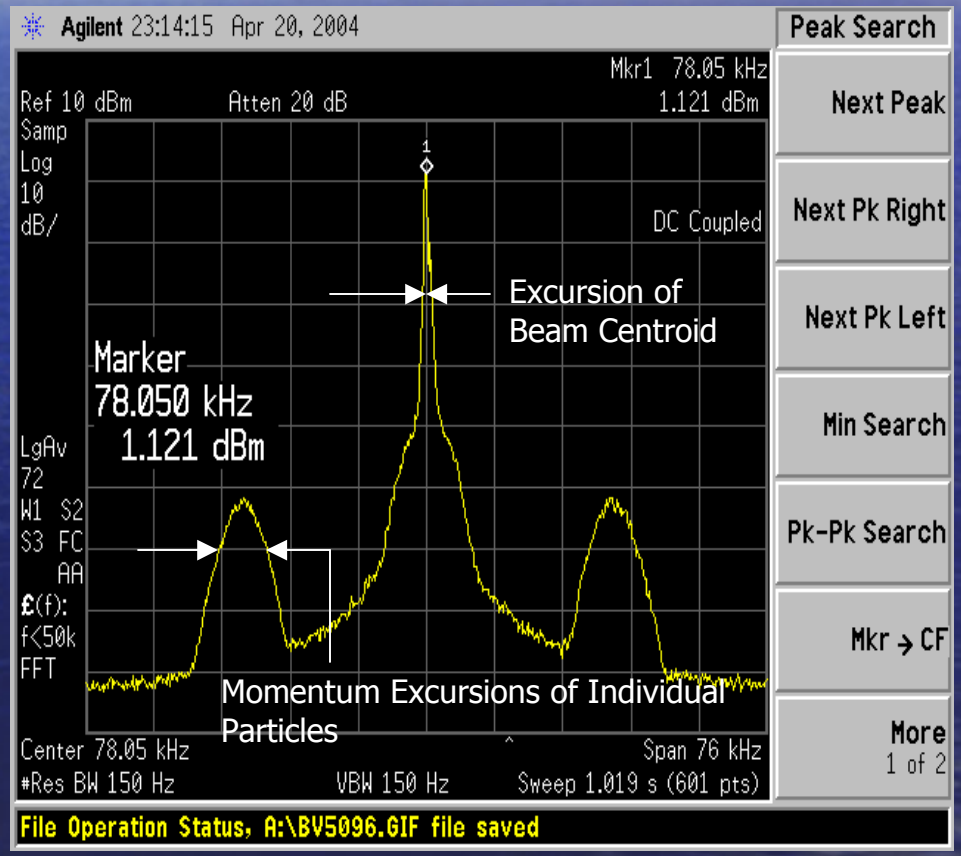


# HFS Beam Experiments

- Goal is to establish HF Schottky as reliable diagnostic at Store for the following:

`

  - Emittance
  - Chromaticity
  - Tune Spread
  - ✓ Tune



# Emittance (RMS)

- $Schottky\ Power \propto (RMS\ Beam\ Size)^2 \cdot N$
- $Pd = \langle I_b x_d \rangle^2 \cdot \frac{R_t \cdot T^2}{4} K_b^{\ 2} \quad (W)$
- $\langle I_b x_d \rangle^2 = a_{rms}^{\ 2} \cdot e^2 \cdot f_{rev}^2 \cdot \frac{N}{2} \quad , a_{rms}^{\ 2} \propto \varepsilon_{rms}$

  RMS Beam Radius
- $\varepsilon_{rms} = k \cdot \int_{3dB} [P_{SideBand}(f) - P_{Cal}]\, df$

  Scaling Coefficient

# Emittance Experiments

- Calibration:
  - Obtain accurate system calibration
    - Reflect measured power to detected power
- Experiments:
  1. Determine effects of beam position
     - Displacement Power Change, Coherent Saturation?
  2. Correlate to IPM during IBS Studies
  3. Analyze Beam Intensity dependence
  4. AC-Dipole Studies
  5. Compare to IPM during Store (parasitic)

# Chromaticity

- Measurement of Betetron widths

- <u>Chromaticity Beam Tests:</u>
  1. Correlate to Tepikian's modulation method results.

# Tune Spread

- Measurement of sideband and center spectral widths.
  - Benchmark?

# LF Schottky Beam Experiments

- Use new Tracking Receiver along with E4445A Spectrum Analyzer to determine viability of LF Schottky diagnostics at injection, up Ramp and at Store.

- Spectrum Analyzer on single plane, DSP's on all planes
  - All planes available to Controls

- <u>Parasitic Experimentation includes:</u>

1. Tune (Injection, Ramp and Store)
2. Chromaticity (Injection, Ramp and Store)

# The End