XMP-54

FIDA checkout

**Validate FIDA signals
with "quiescent" plasmas (no strong MHD)**

M. Podestà
W. W. Heidbrink
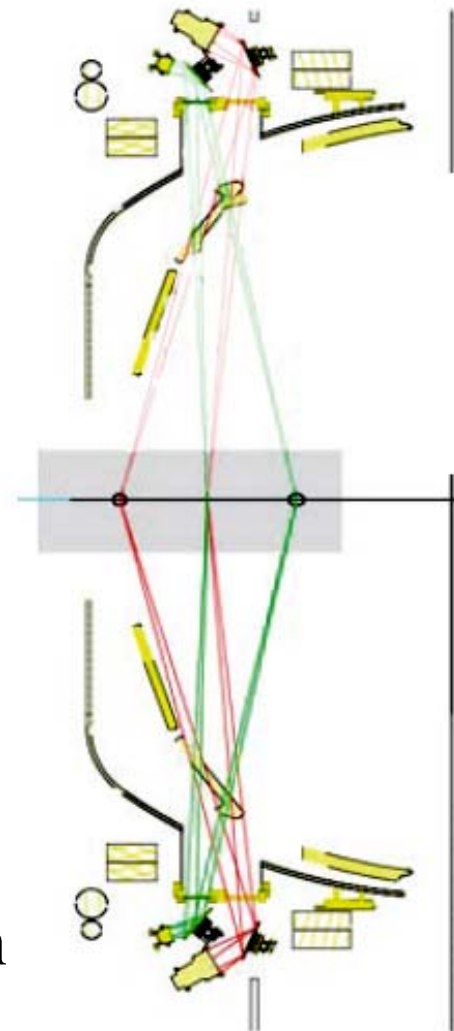
UCIRVINE

NATIONAL SPHERICAL TORUS EXPERIMENT

Both FIDA systems installed and working

- **Spectrometer** covering 2x16 radial positions (R=85cm -> 155cm)
  - Resolution: 5cm, 10keV, 10ms
- **Multi-anode PMT** detector, 2x3 radial positions
  - Looking at 100, 120 and 140cm
  - Energy-integrated
 - Sampling rate < 100kHz (50kHz typical)

Neutral Beams

Active view (along beam B path)

*Passive* view

Plasma

A

B

C

Top view
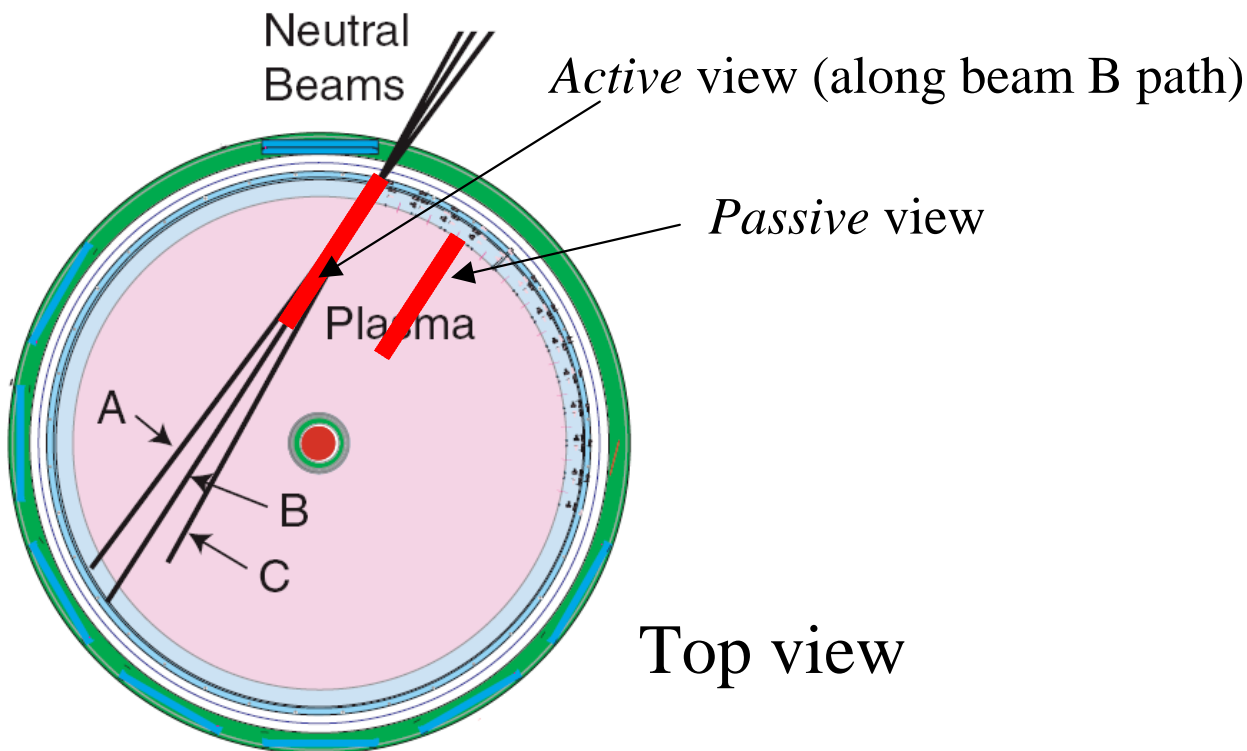
Poloidal cross-section

XMP plan completed successfully

- **Helium plasmas, density ~ 3 x 10^{19} m^{-3}:**
  - **NB sources at 60kV to avoid low-frequency MHD**
  - **Different modulation patterns**
    - **Check temporal response and dependence upon specific NB source**
    - **Get "reference" profiles, to compare with strong MHD and/or RF cases**
    - **Compare background subtraction techniques**
      - Beam ON - beam OFF (DIII-D like)   *vs.*   Active - Passive views (NSTX)
- **Repeat in Deuterium plasmas**
  - **Comparison with FIDA simulation code**
  - **Quantitative comparison with neutron rate**
  - **Better signal-to-noise**
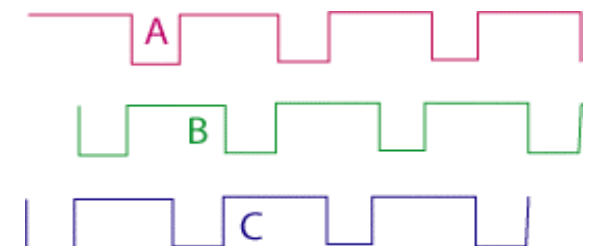- **Complete "Beam-into-gas" database with sources B and C**
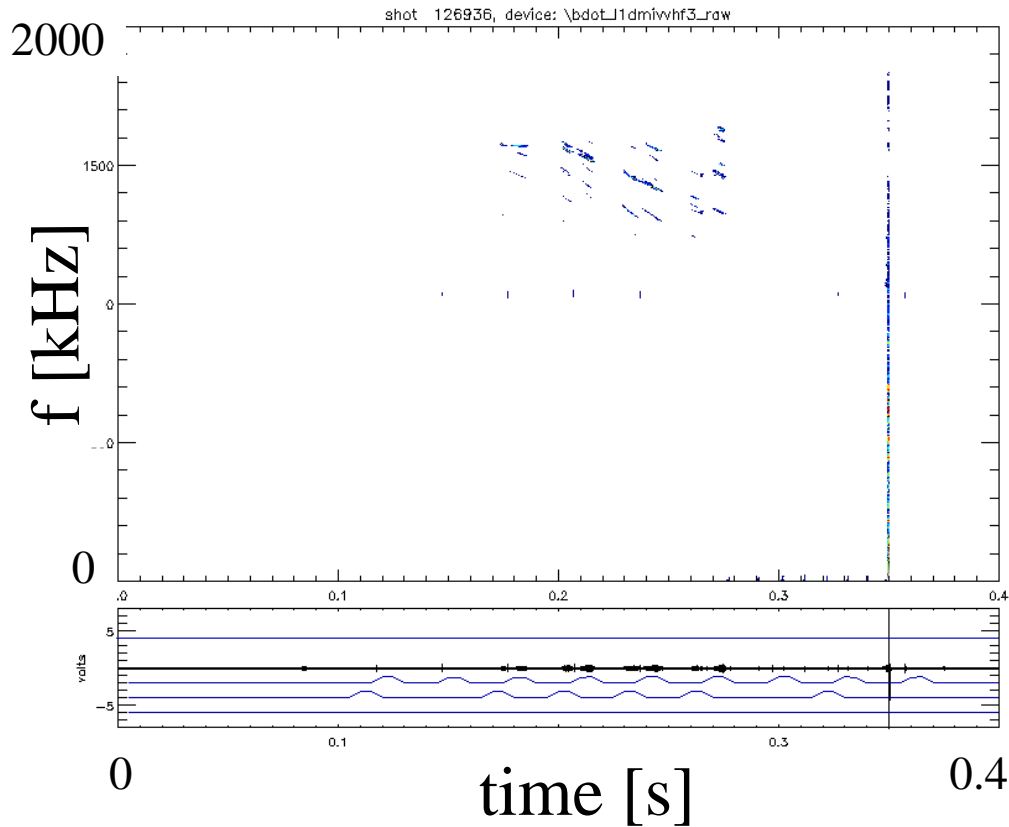
50% duty cycle
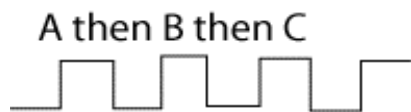
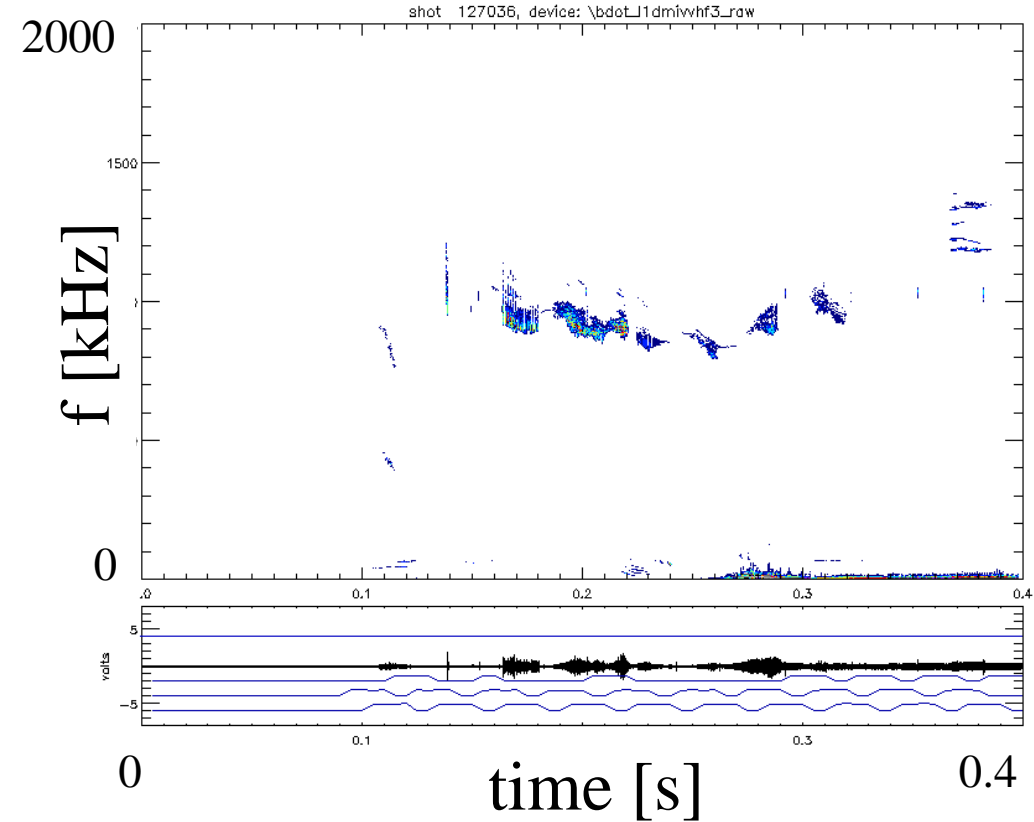1 equivalent steady source
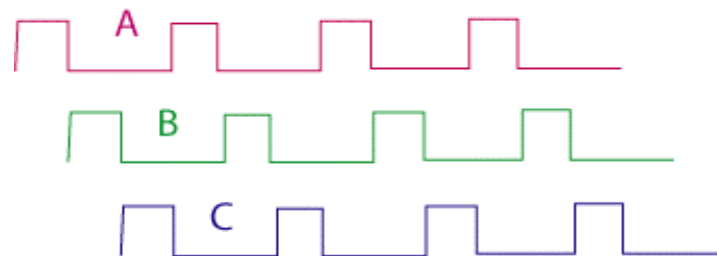
2 equivalent steady sources

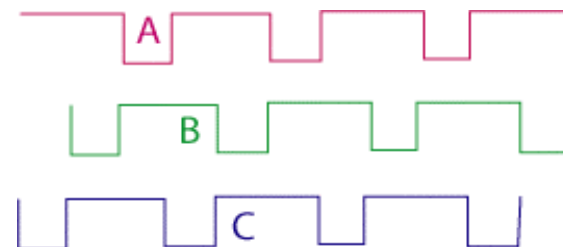# Quiescent plasmas obtained in both He and D

Helium, sh#126936
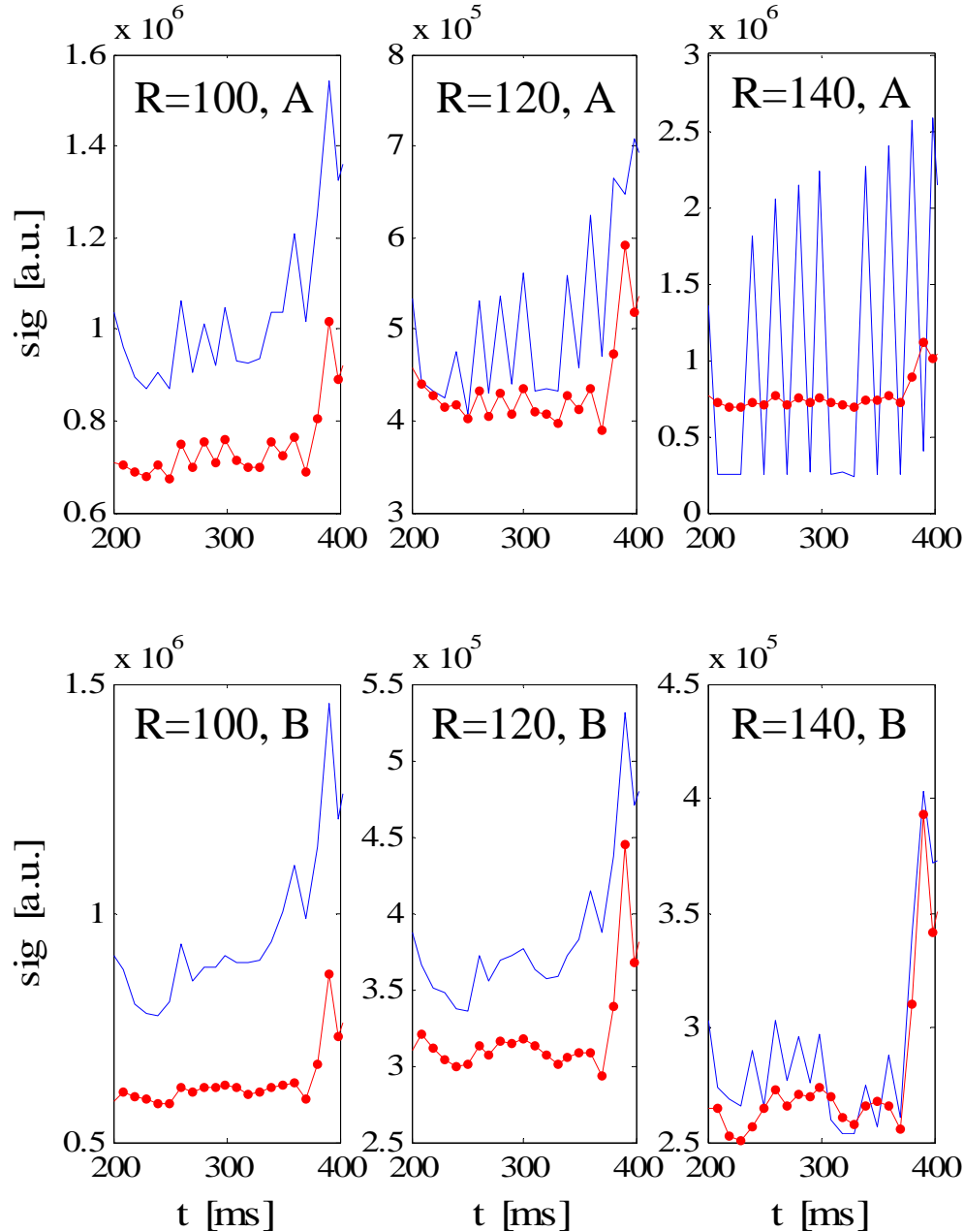
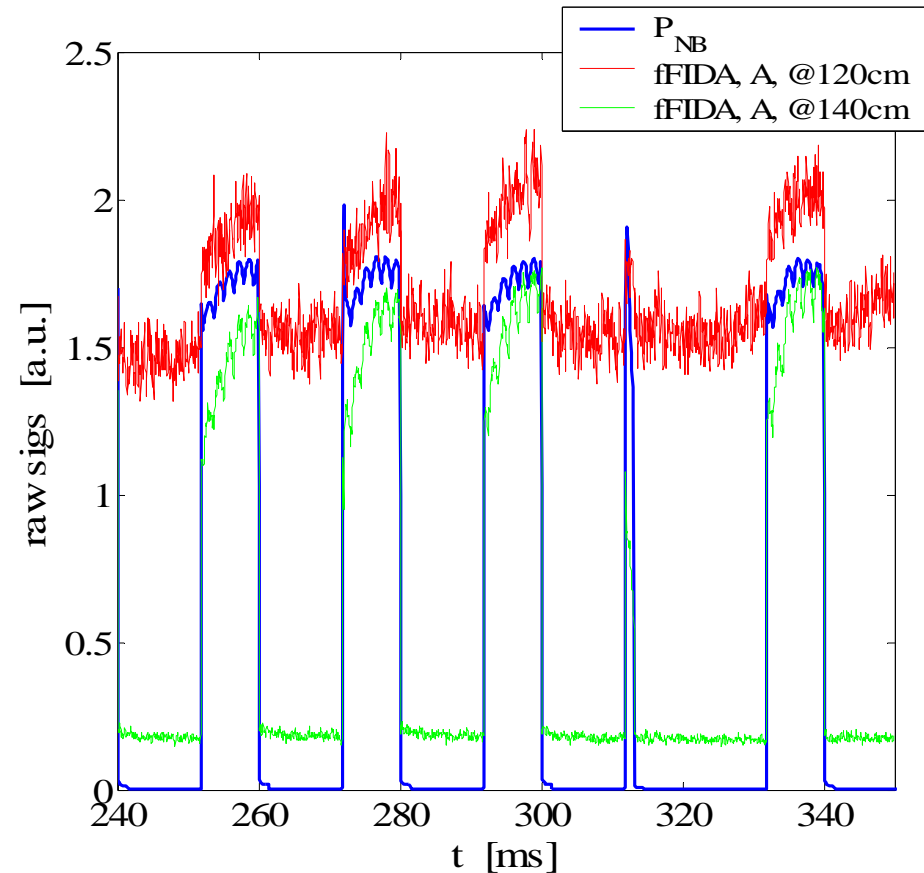Deuterium, sh#127036

2 equivalent
steady sources @60kV

Consistent signal response to beam modulation

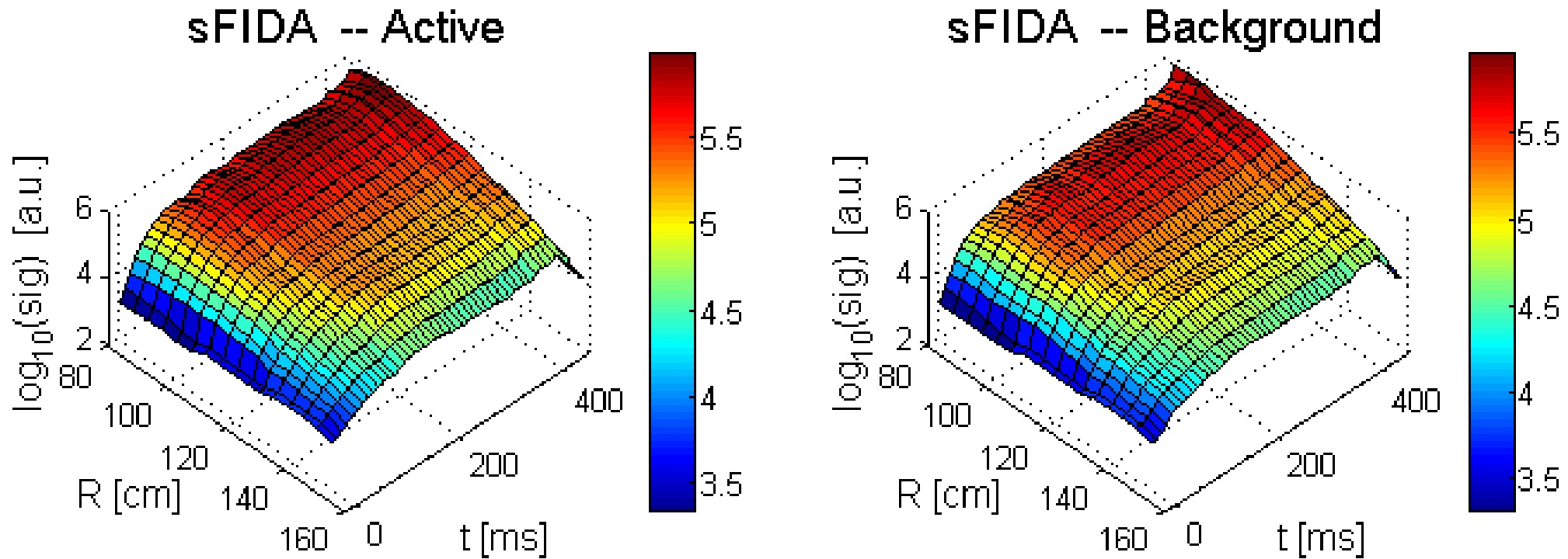
shot127041 -- filter angle=3deg

f-FIDA and NB power

Source B at 90kV, D plasma
Red: s-FIDA
Blue: f-FIDA (re-sampled)

s-FIDA: wavelength calibration OK, need intensity calibration

Ex: Temporal evolution of spatial profile, active and passive views
(Signals integrated over 30-80keV energy range)

Relative (fiber-to-fiber) intensity calibration in progress

Interesting data from "Beam-into-gas" shots

sh#126814, beam into gas w/ fields, sum over time

Cold D-alpha

Doppler-shifted emission from injected neutrals (full, 1/2, 1/3 energy)

Doppler-shifted emission from ionized neutrals (full, 1/2, 1/3 energy)

Impurities

CII lines

R=95cm
R=150cm
R=120cm

counts

λ [nm]

Source A

Bay A

Blue-shifted emission

Red-shifted emission