FIDA XMP

Motivation: Check out FIDA in special quiet plasmas so we trust it for instability studies

Goals:

Understand relative source contributions

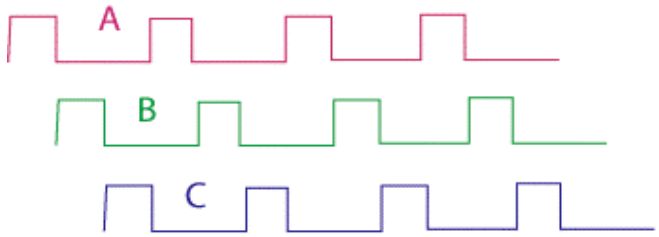
Reliable theoretical profile to validate spatial profile

Verify energy dependence

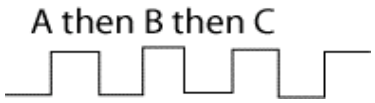
Approach: Use low voltage to avoid fast-ion instabilities; modest density (3-4 e13), 0.8 MA; helium then deuterium fill gas (beam halo)

Beam Modulation Patterns (All ~ 60 kV)

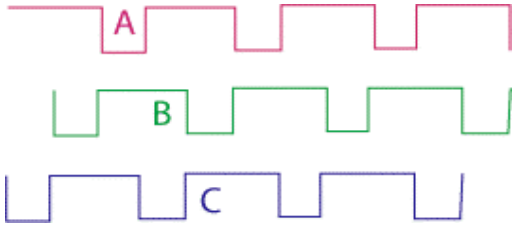
1. One equiv. source



2. 50% duty cycle



3. Two equiv. sources



4. Isolated blips

All beam pulses (or notches) are 10 ms (matches slow FIDA timing)

Experimental Run Plan

Start with helium fill gas.

- **One equivalent steady source** (33% duty cycle each); A-B-C then A-C-B (2 shots)
- **50% duty cycle** First A for ~ 100 ms, then B, then C (1 shot)
- **Two equivalent steady sources** (67% duty cycle each) (1 shot)
- **Isolated blips** (10 ms on, 50 ms off) One source each shot (3 shots)
- **Energy variation** Raise beam voltage on favorite case to change Doppler shift (1 shot)

Switch to deuterium fill gas. All sources back on 60 kV.

Repeat steps 1-4 (in order of best results)

Essential Resources

- Three neutral beam sources
- Magnetics
- Fast-ion diagnostics: FIDA, neutrons, NPA, SSNPA, sFLIP.
- Plasma diagnostics: Thomson scattering, CHERS