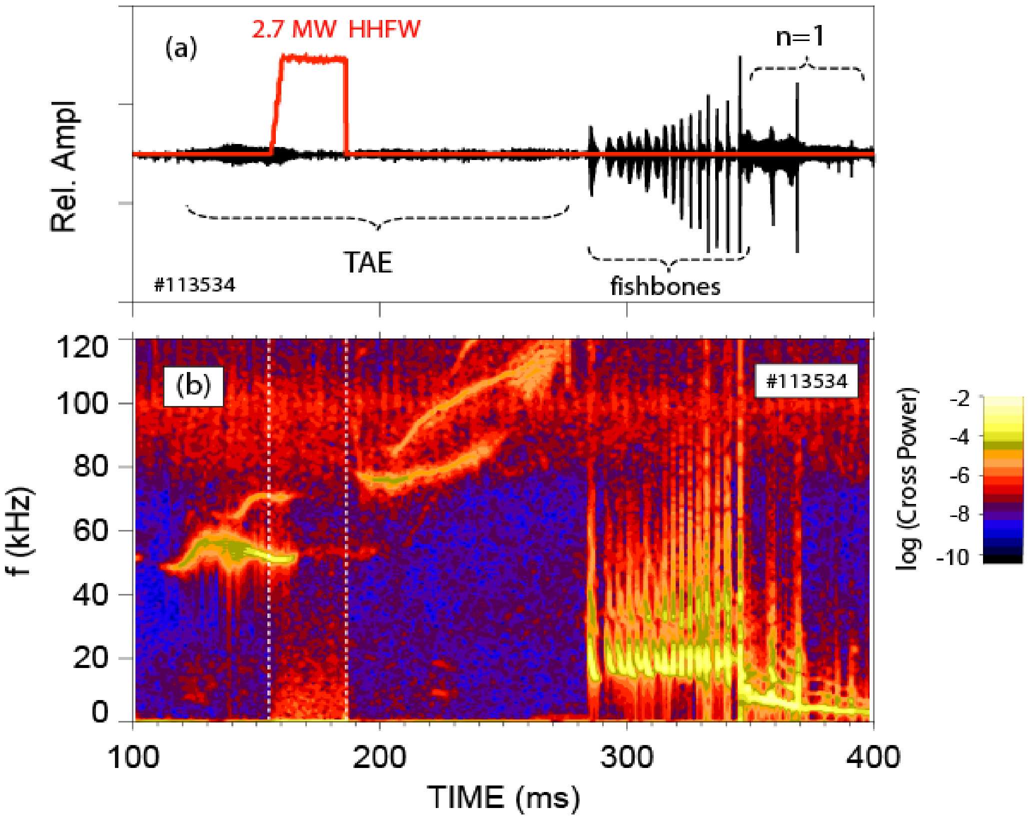
Effect of HHFW on Rapidly Chirping Modes:

The Sequel



- Berk-Breizman model
- New Capabilities

Plasma Phys. Cont. Fusion 48 (2006) 1347.

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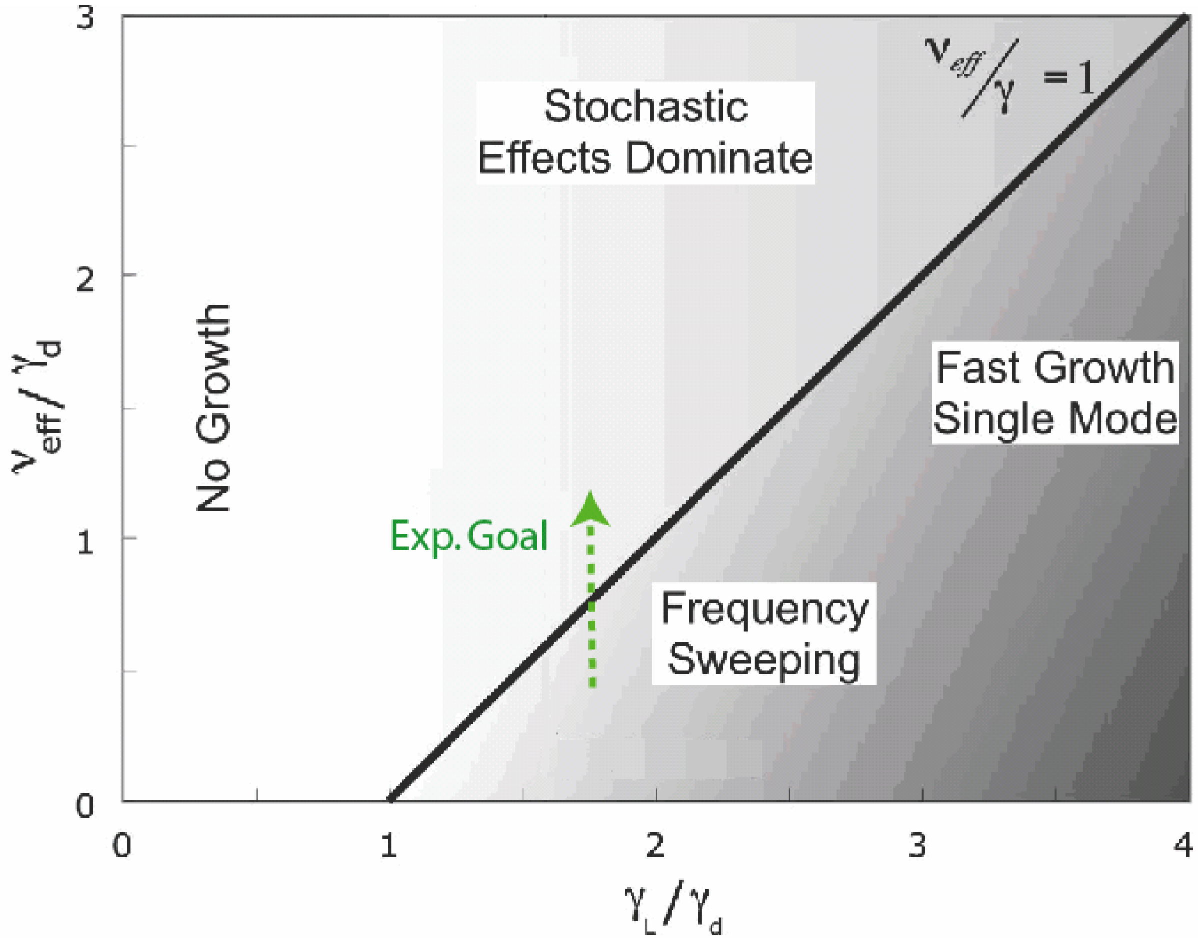
Stochastic Acceleration destroys phase space "clumps" and "holes" that cause chirping



γ_L – linear growth rate

γ_d – nonresonant dissipation

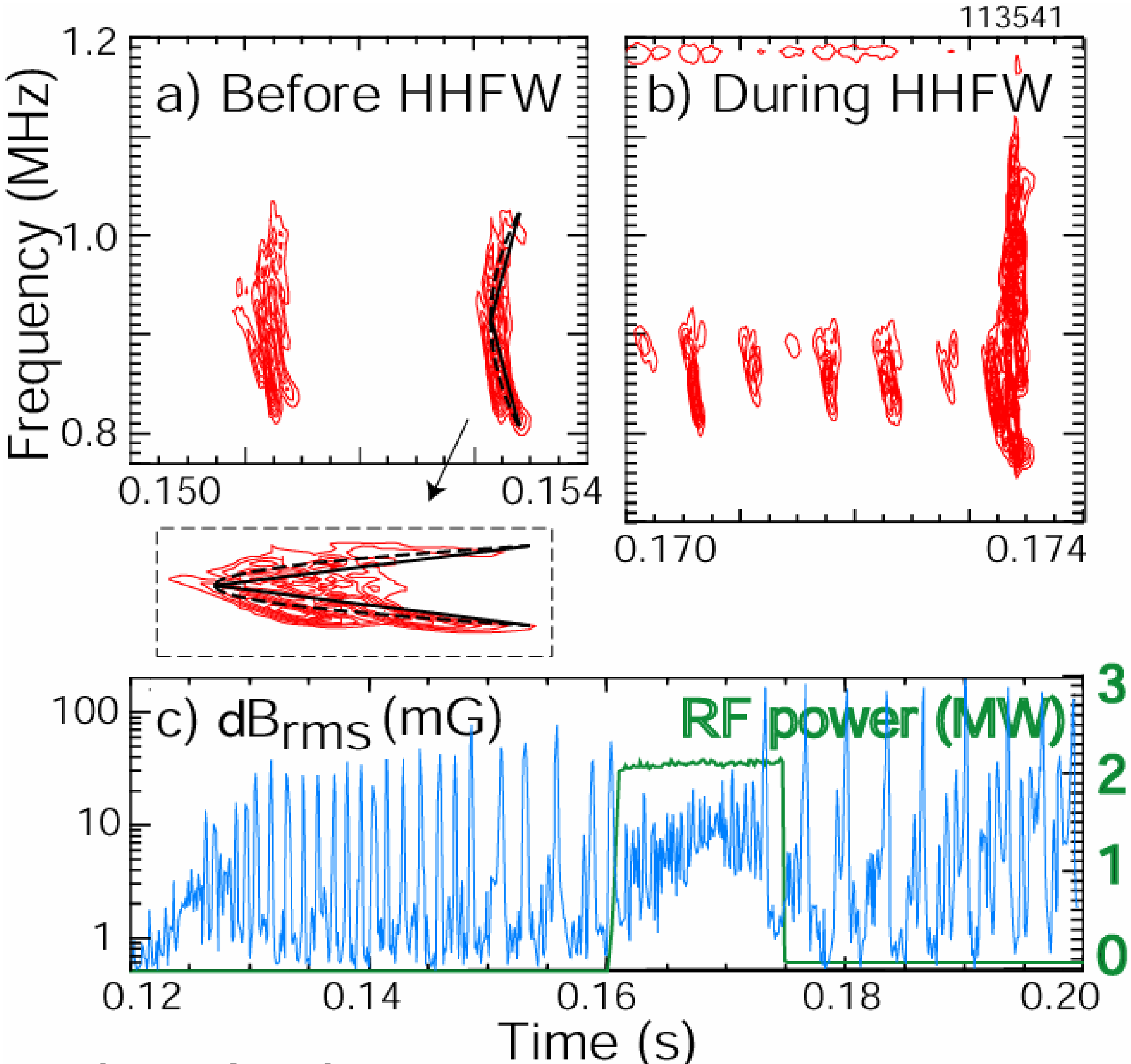
ν_{eff} – collisionality parameter

$\gamma = \gamma_L - \gamma_d$

- **Berk-Breizman model consistent with several experiments**
- **Use HHFW to scatter fast ions that resonate with the instability**

D.Maslovsky *et al.*, Phys.Plasmas **10** (2003) 1549

HHFW Effect on Angelfish in previous experiment



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Conclusions of Previous Experiment & Reasons for an Encore

- **HHFW did not suppress chirping of fishbones**
- **Changed TAEs on slow timescale but did not suppress chirping**
- **Probably altered CAE/GAE chirps (limited data)**
- **Need better insight into a) part of phase space that drives instabilities & b) effect of HHFW in phase space → Better eigenfunction & fast-ion diagnostics**

- **FIDA can measure HHFW fast-ion absorption profile**
- **Reflectometer can measure mode structure**

Experimental Requirements

- Low Toroidal Field (3-4 kG)--Previous angelfish regime
- L-mode for reflectometer data --Need mode structure to identify spatial location of fast ions that drive the instability
- Edge conditions optimized for HHFW--Need substantial power despite low field
- Beam timing optimized for FIDA/NPA--Need core fast ion measurements to calculate ν_{eff} of fast ions that drive angelfish

Strawman Runplan

1. Establish L-mode condition with Angelfish (reference shot #113541: 4 kG, 800 kA, 90 keV Source B)

1a. If no Angelfish, try different sources. If still no Angelfish, lower toroidal field.

2. Adjust density for optimal reflectometer data.
3. Apply 30 ms HHFW pulses during Angelfish.
4. If HHFW has an effect, run several repeat shots with & without RF to confirm reproducibility.
5. Beam notches in best cases to check FIDA/NPA data.