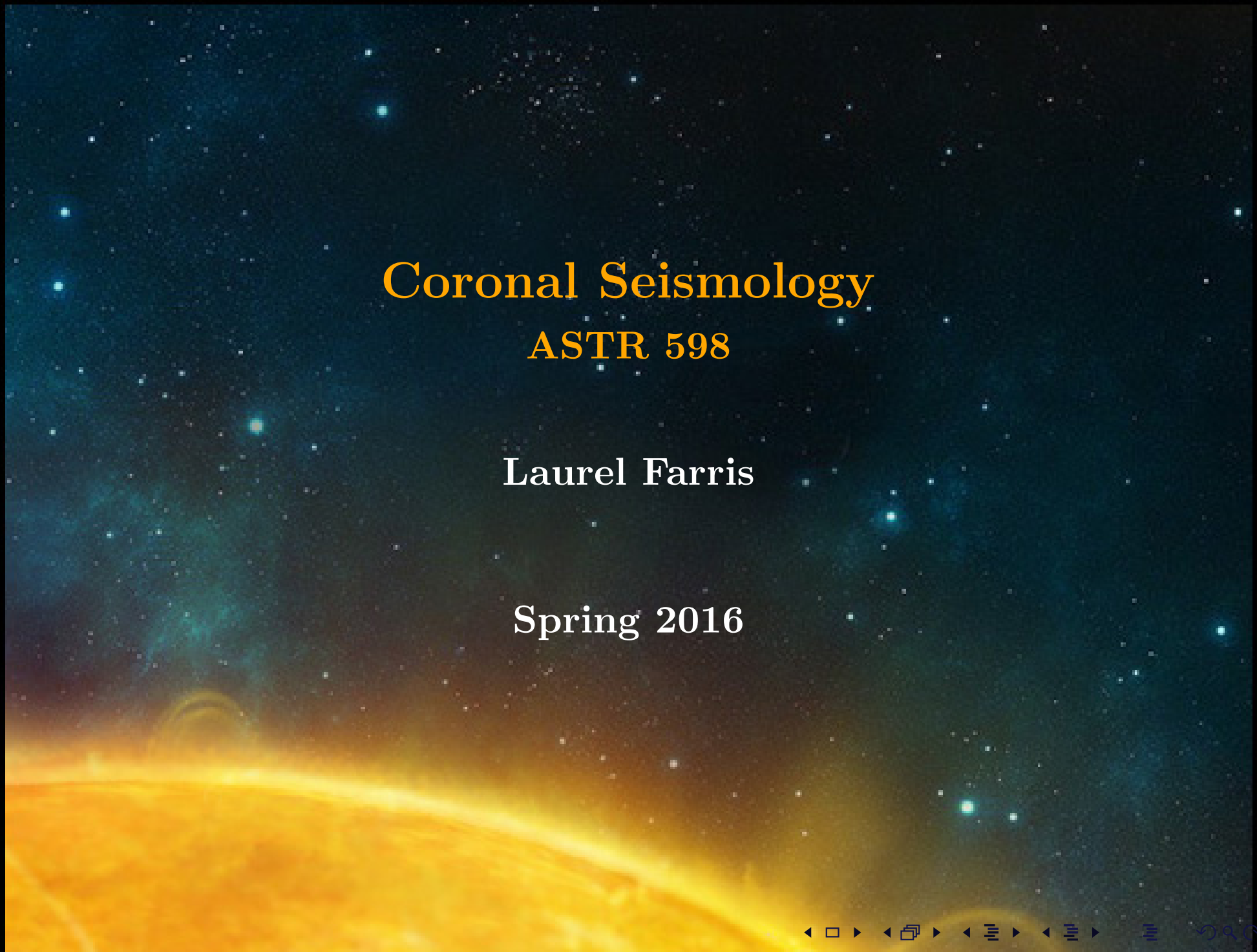


Coronal Seismology

ASTR 598

Laurel Farris

Spring 2016

Overview

The body of the frame

Motivation/Main Scientific Question

- The coronal heating problem

Basic Wave stuff

Types of waves/oscillations:

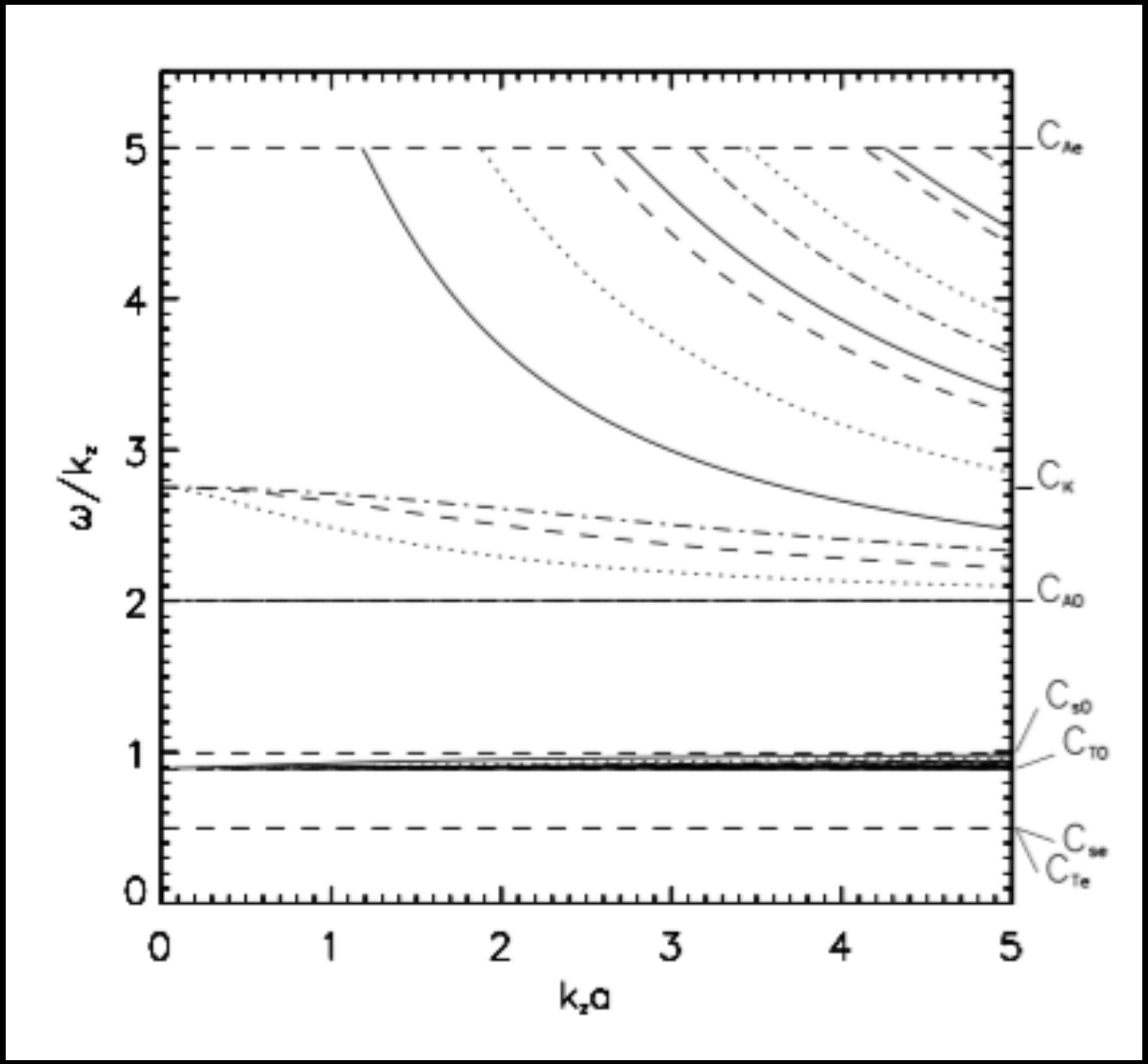
- Alfvén
- fast $C_{A_0} < C_{fast} < C_{A_e}$
- slow (acoustic) $C_{T_0} < C_{slow} < C_{s_0}$

Modes:

- Kink
- Sausage
- Acoustic

Basic MHD equations

Maybe... See Aschwanden 6.1.3


5
4
3
2
1
0
0
1
2
3
4
5
ω/k_z
k_z a
C_Ae
C_ik
C_A0
C_s0
C_T0
C_se
C_Te

Instabilities

$$\xi(x) = \xi(r)e^{i(kz+m\phi)}$$

Kink

- fast magnetoacoustic waves
- m = 1
- low plasma β
- present in coronal loops

Sausage

- m = 0

Helical/Torsional?

Kinks and Sausages

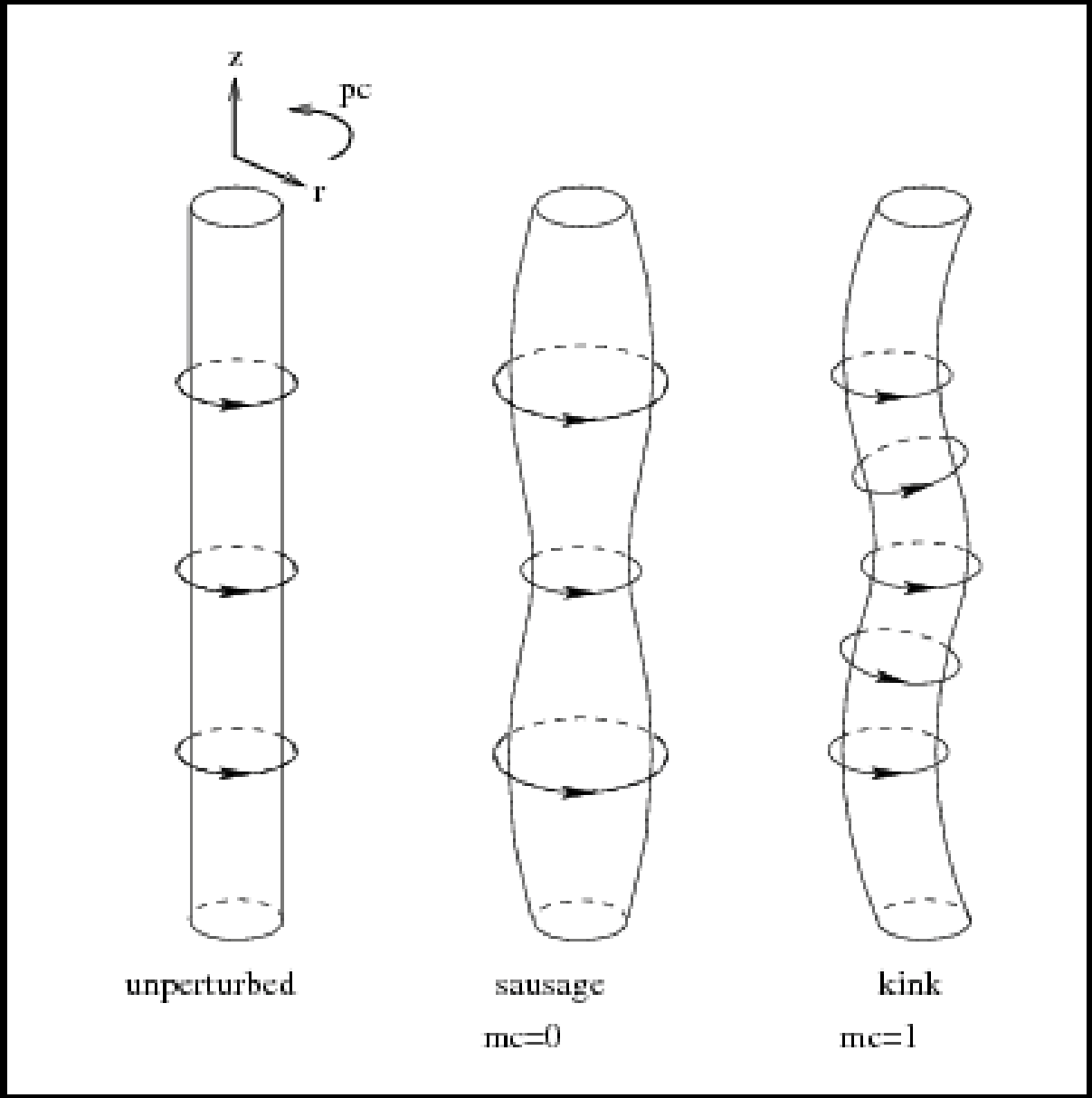


Figure: *

Kink1: Coronal loop oscillations observed with the *Transition Region And Coronal Explorer (TRACE)*

- Gaussian vs. exponential
- Plasma motions around footpoints of coronal loops

Kink2: Excitation and damping of broadband kink waves in the solar corona

Sausage1: Observations of sausage modes in magnetic pores

Sausage2: Sausage waves in transversely nonuniform monolithic coronal tubes

Important Properties

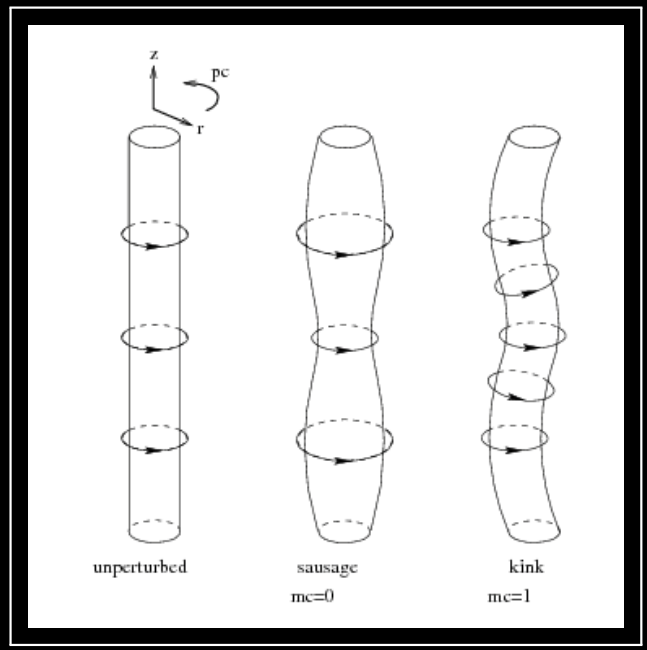
	timescale	**sizescale**	**obs. method**
kink osc	value	value	value
sausage osc	value	value	value
acoustic osc	value	value	value
acoustic waves	value	value	value
fast waves	value	value	value
torsional modes	value	value	value
mixed modes	value	value	value

Example Table

		Condition (Gold standard)	
		True	False
Test outcome	Positive	True Positive	False Positive
	Negative	False Negative	True Negative

Example of Two Column Output

Practical TEX 2005
Practical TEX 2005
Practical TEX 2005



My Research