

# SOAR Observations of Hot DQ White Dwarf Stars



WITH COMMENTS ON THEIR HABITS

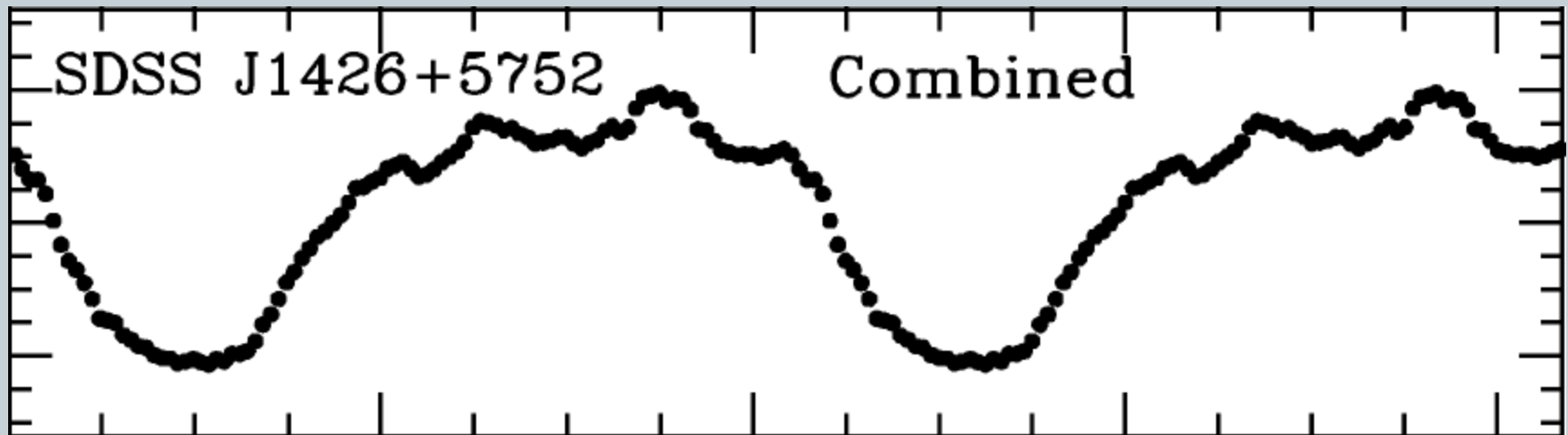
BART DUNLAP  
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL  
HILL

AUGUST 16, 2010



THE UNIVERSITY  
*of* NORTH CAROLINA  
*at* CHAPEL HILL

# Discovery of a Variable DQ



Period	Amplitude
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418 s	1.6%
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1 <sup>st</sup> harmonic	0.5%
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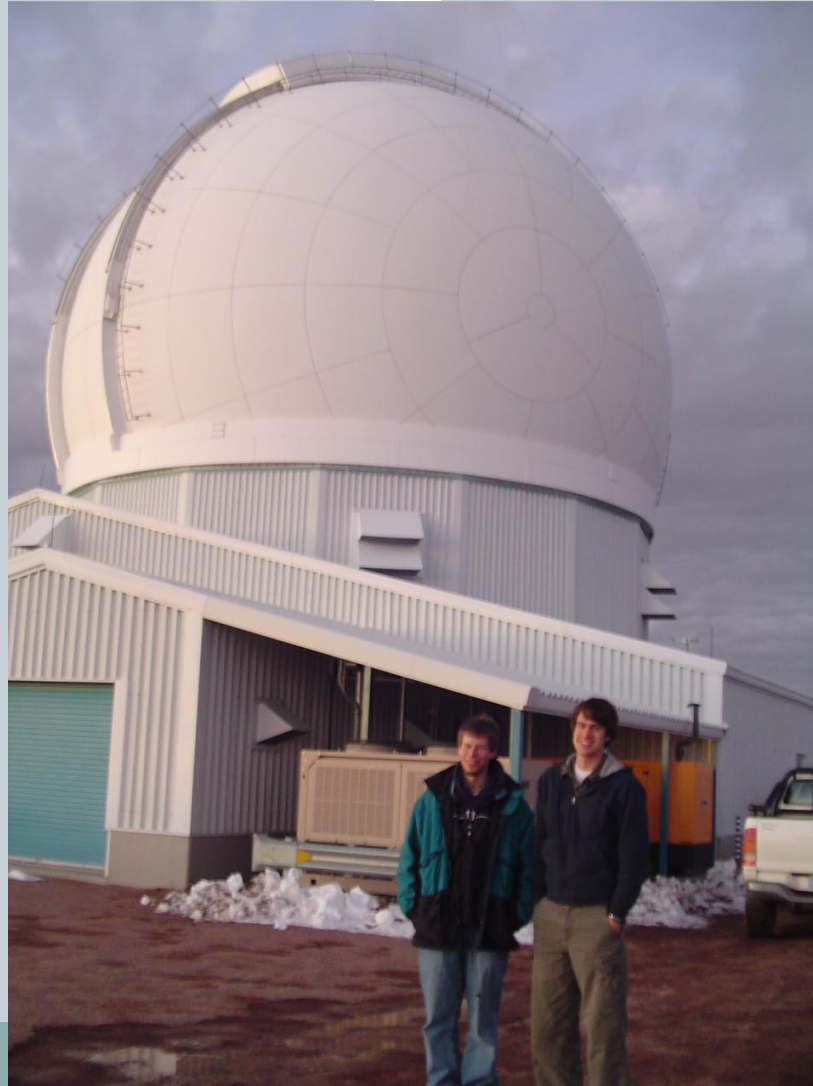
Montgomery et al. 2008

# We Went Looking For Another One

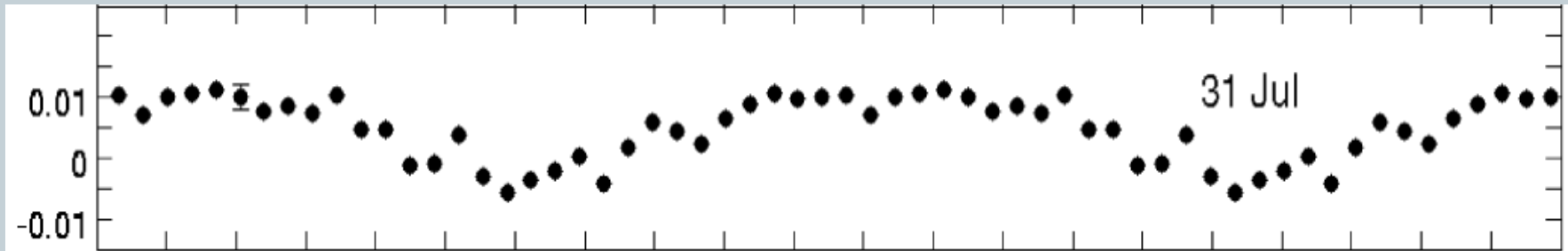
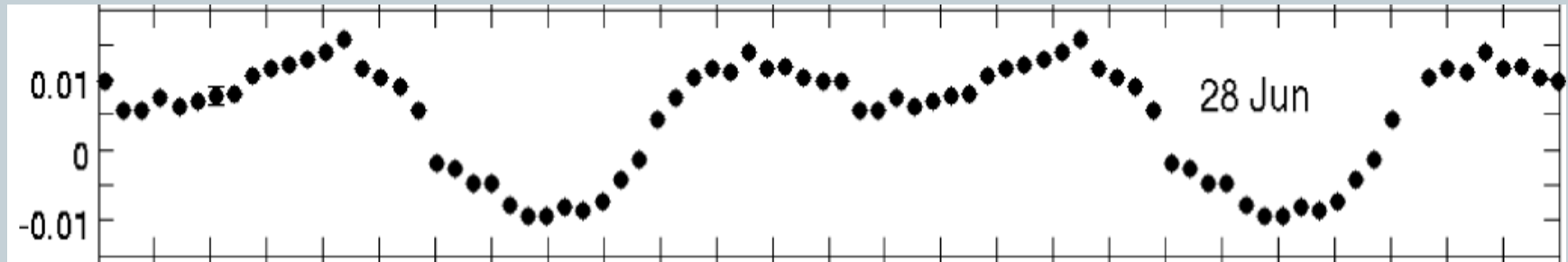


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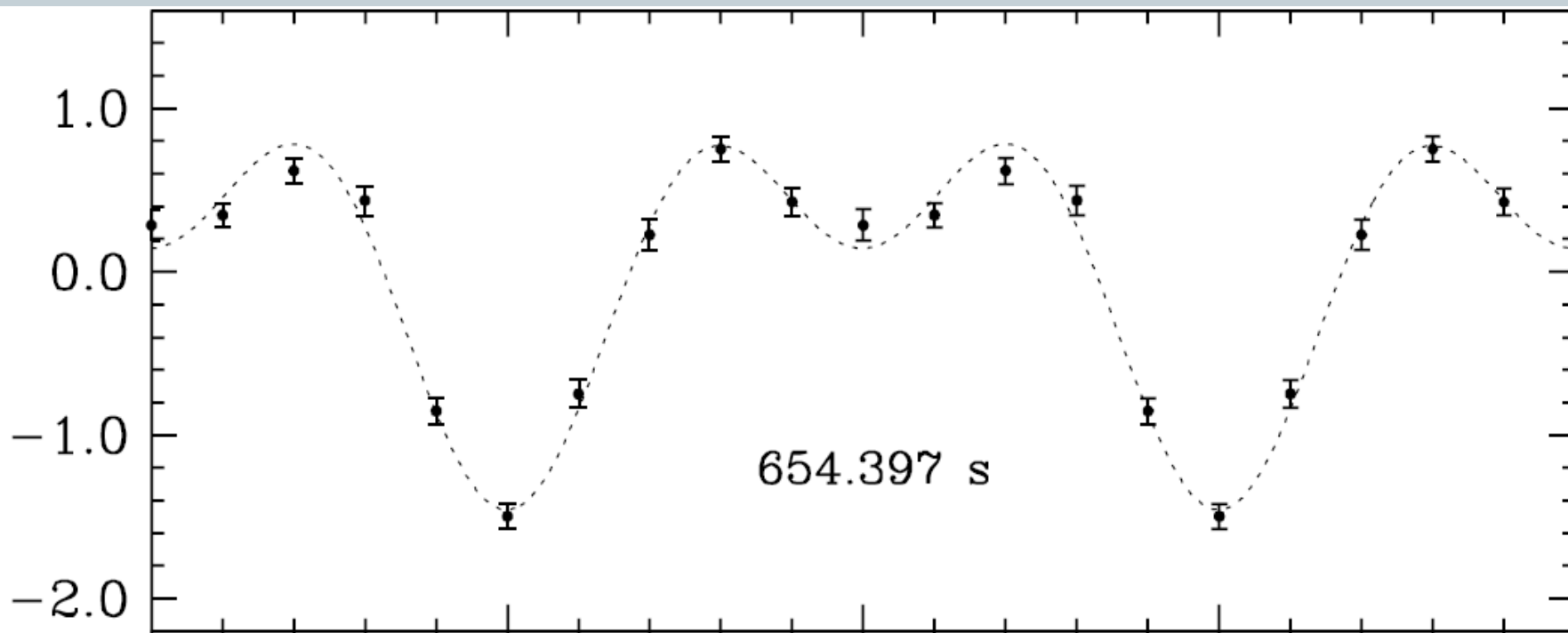
# The SOAR Telescope



# Two New DQVs



# SDSS J2200-0741



**Period**

**Amplitude**

**654 s**

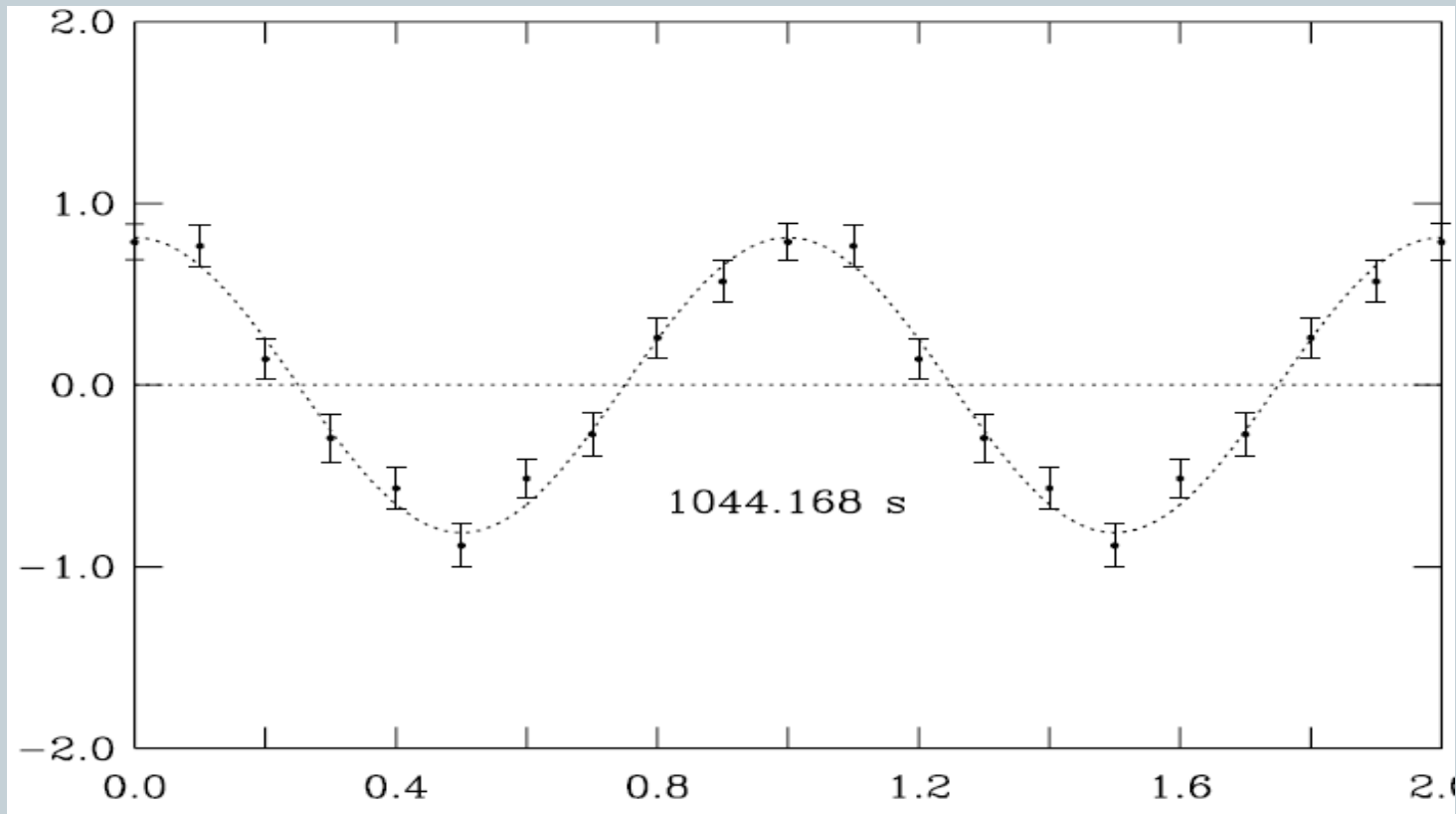
**0.8%**

**1<sup>st</sup> harmonic**

**0.8%**

Dufour et al. 2009

# SDSS J2348-0942



**Period**

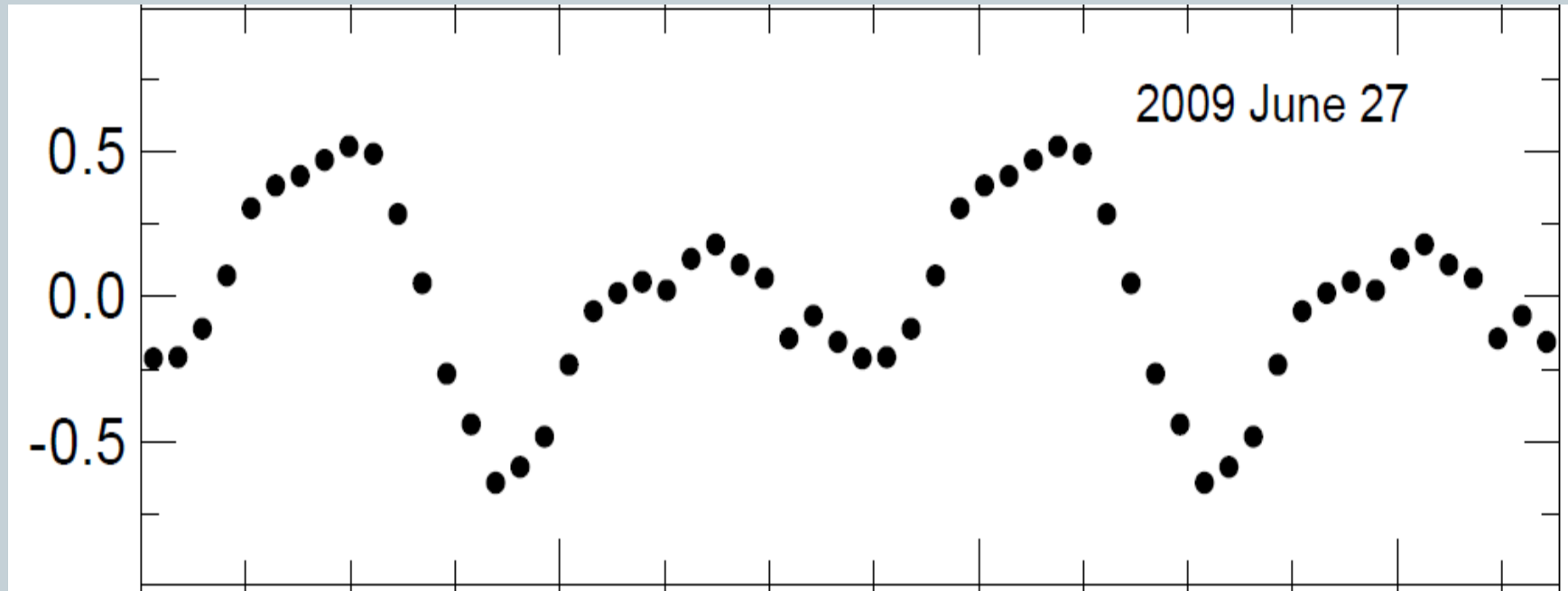
**Amplitude**

**1044 s**

**0.8%**

Dufour et al. 2009

# SDSS J1337-0026

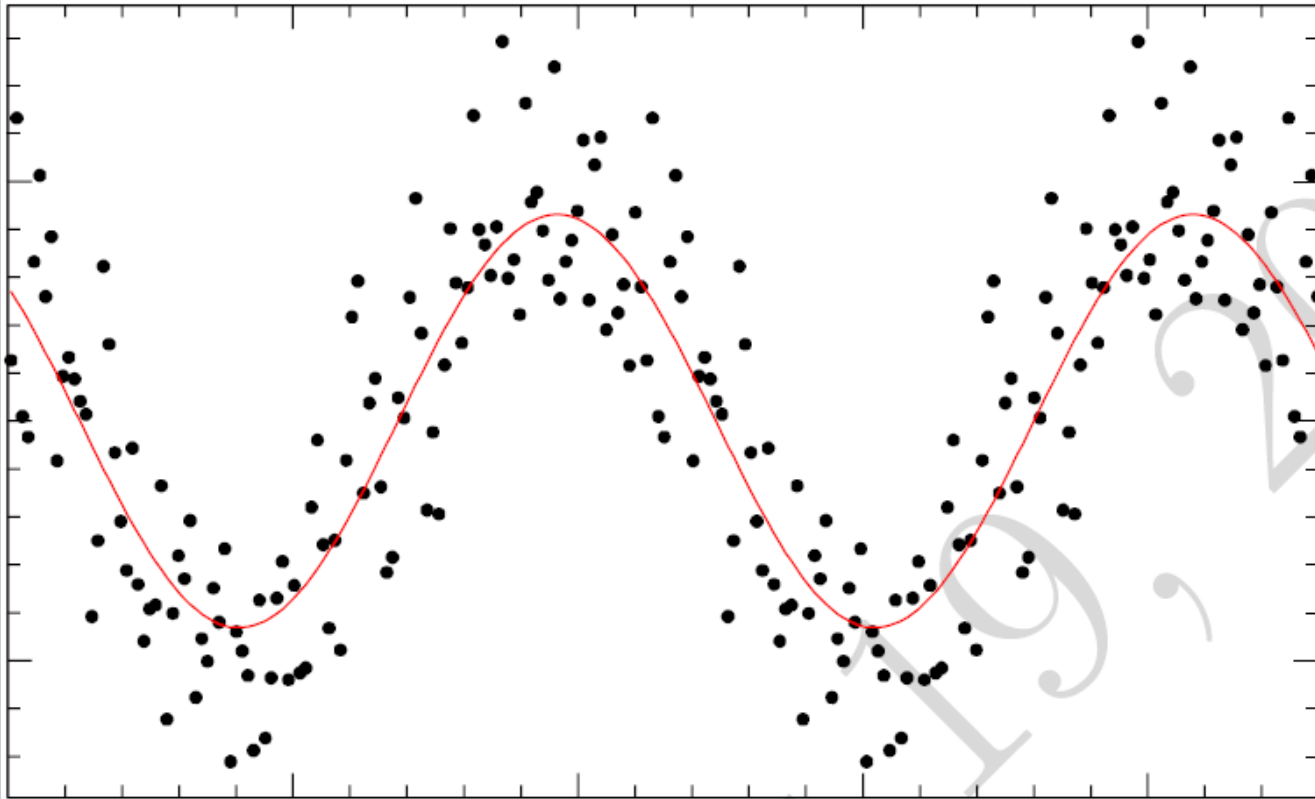


<b>Period</b>	<b>Amplitude</b>
<b>339 s</b>	<b>0.3%</b>
<b>1<sup>st</sup> harmonic</b>	<b>0.3%</b>

Dunlap et al. 2010



# SDSS J1036+6522



**Period**

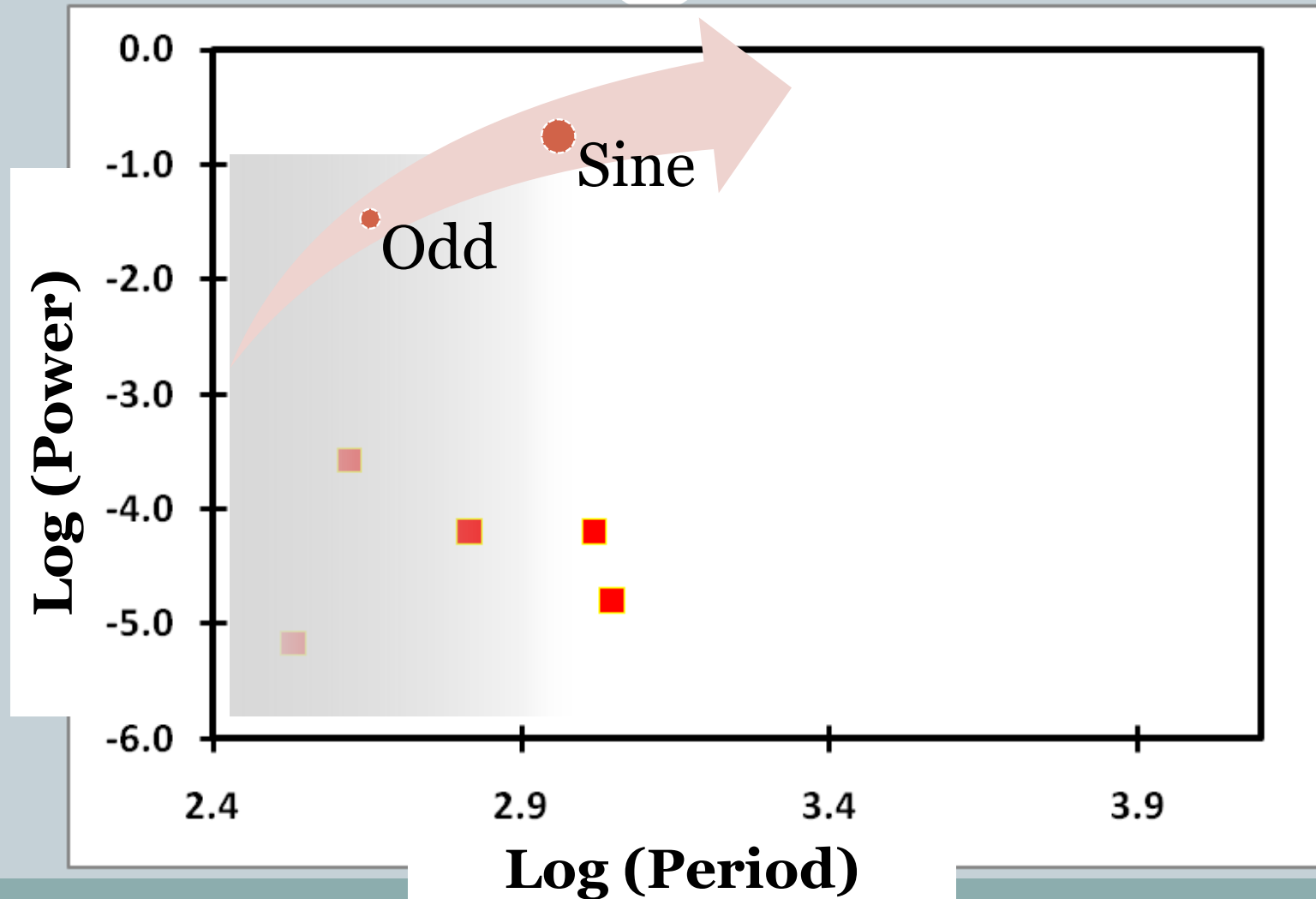
**Amplitude**

**1116 s**

**0.6%**

Williams et al. in preparation

# Hot DQV Power vs. Period



# Why the odd pulse shapes?



**Magnetic**

**Non-Magnetic**

**Odd**

1426+5752  
2200-741



**Normal**



2348-42



# Why the odd pulse shapes?



**Magnetic**

**Non-Magnetic**

**Odd**

1426+5752  
2200-741



1337-026



**Normal**

1036+522



2348-42

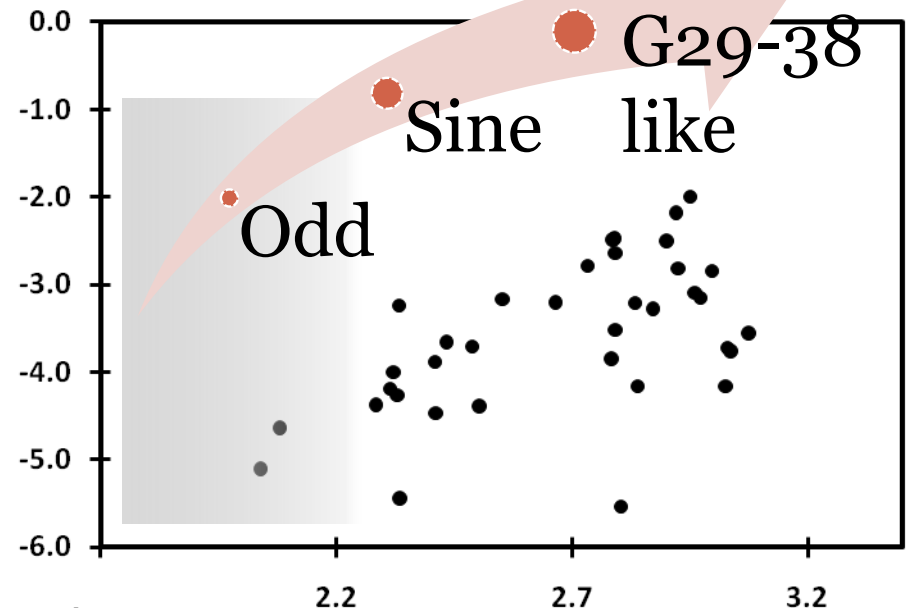
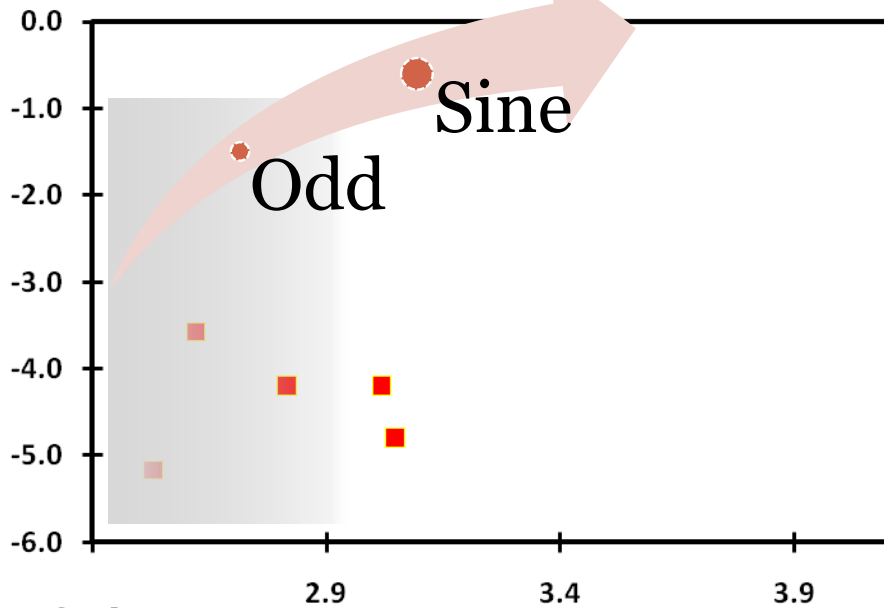


# A Fruitful Analogy



## DQVs

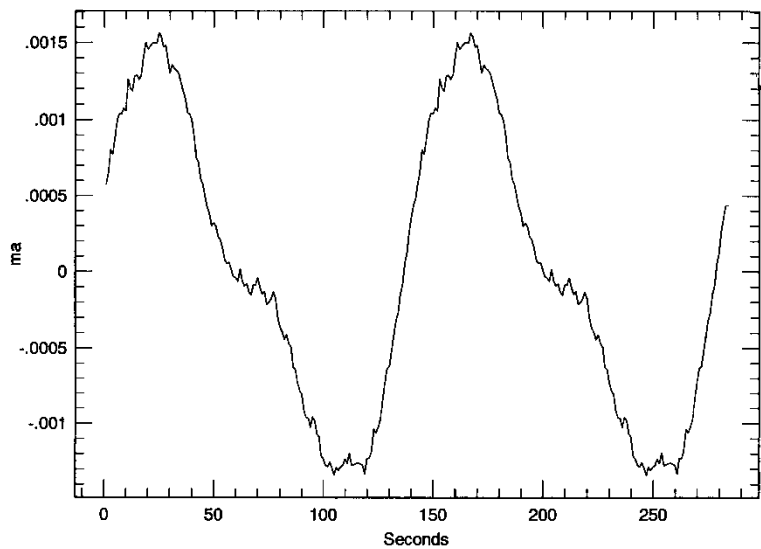
## ZZ Ceti



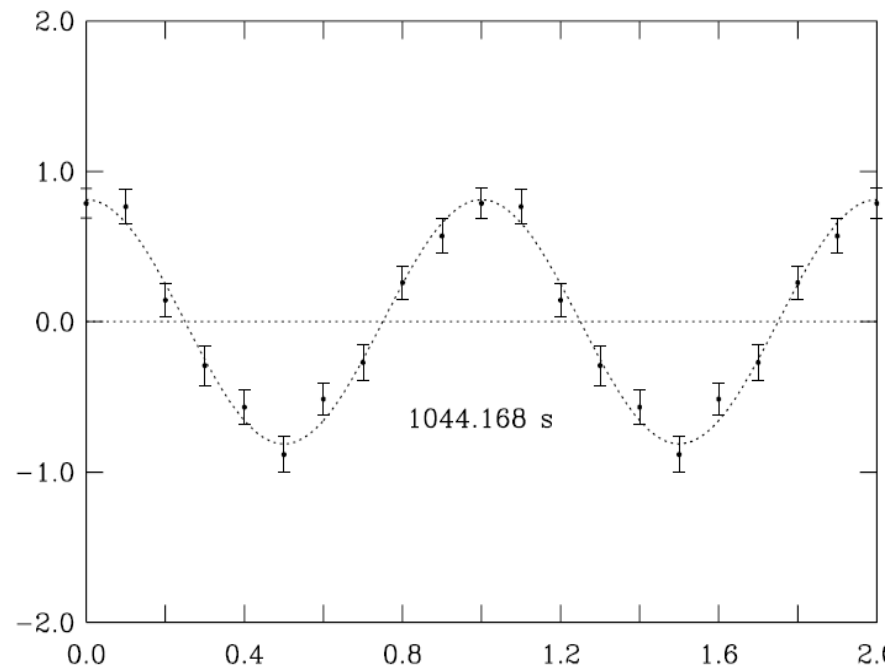
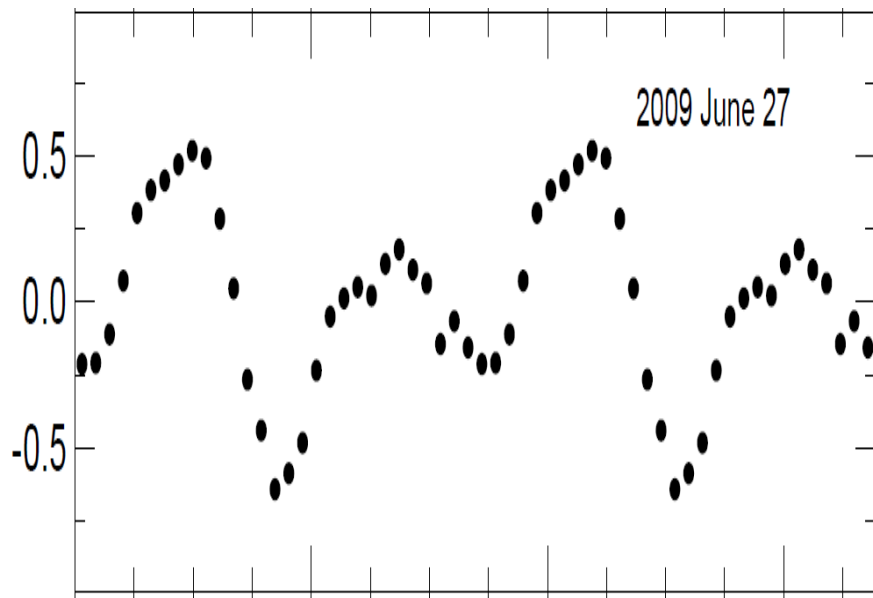
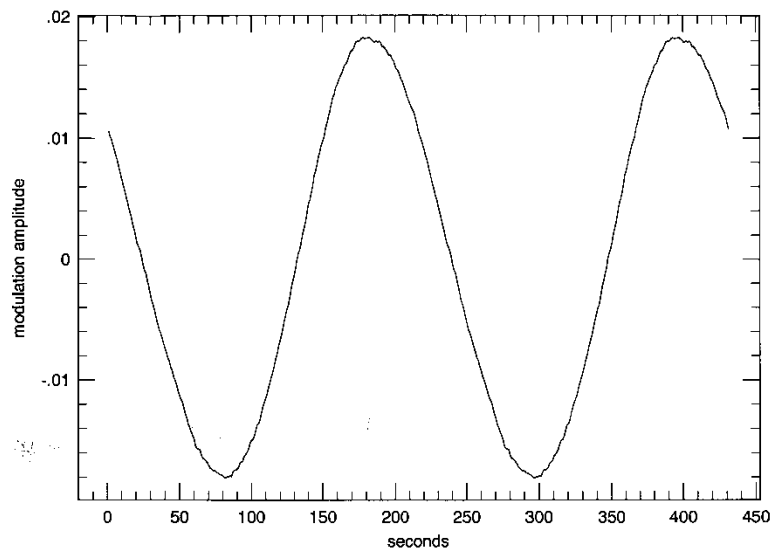
2.4

1.7

**G185-32 (142 s)**

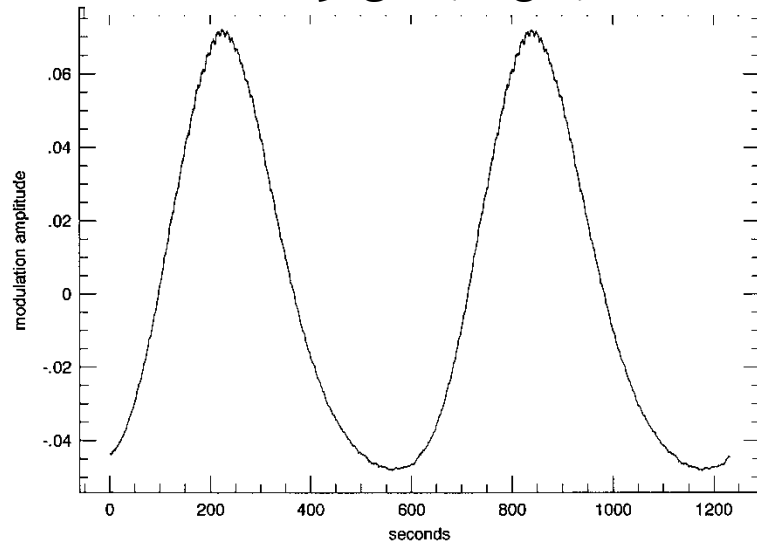


**G117-B15A (215 s)**



# If the Analogy Holds . . .

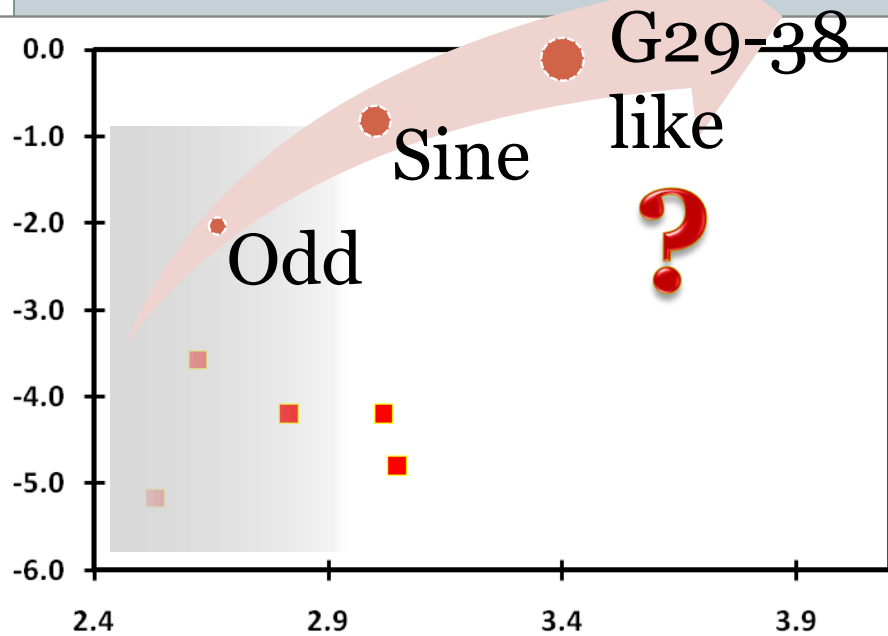
**G29-38 (615 s)**



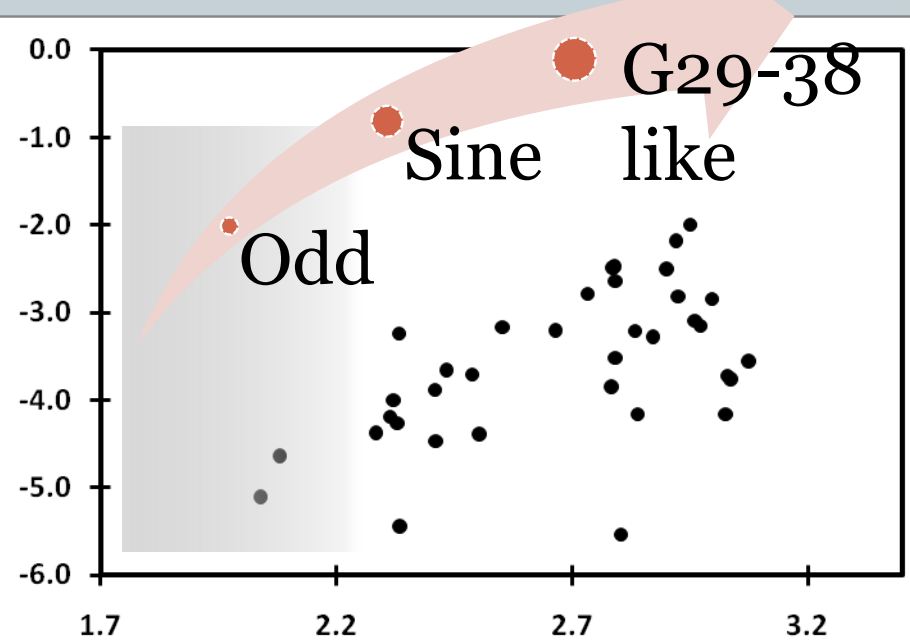
# Is there anything out there?



## DQVs



## ZZ Cetus

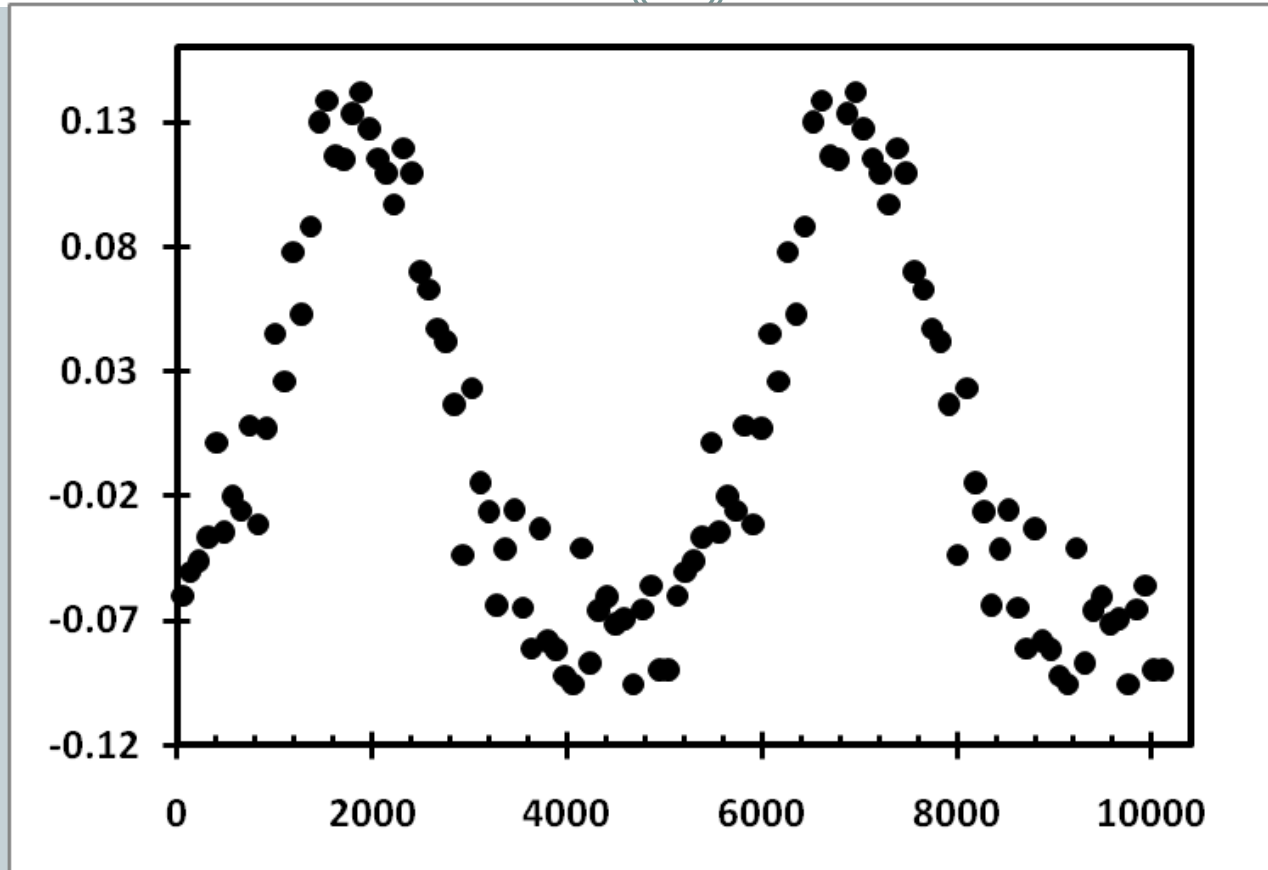




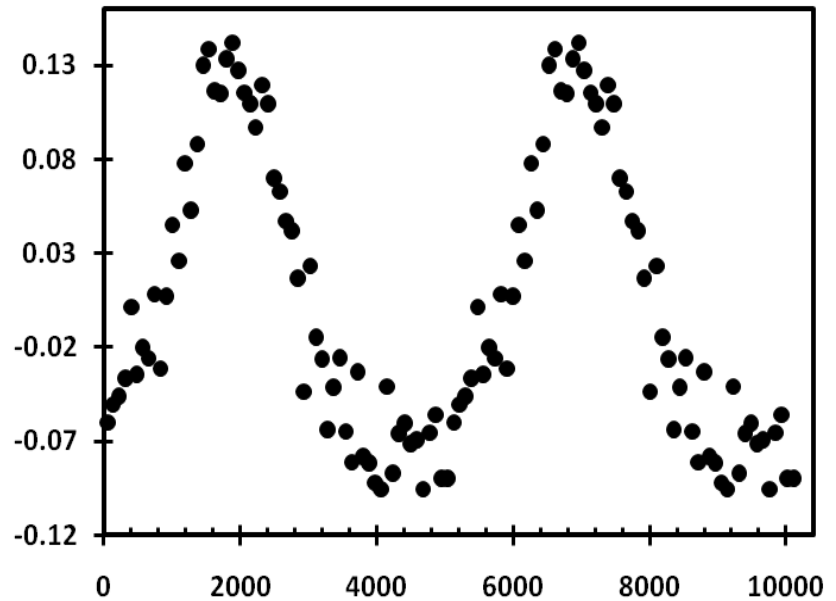
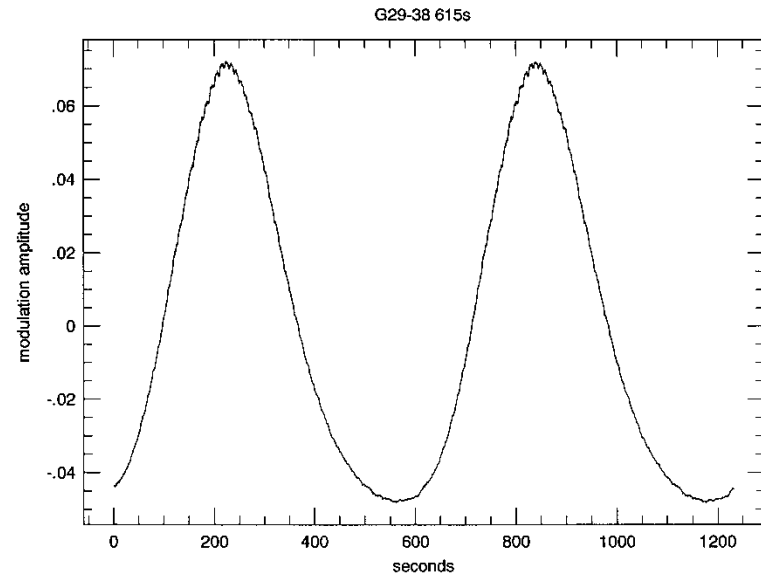


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# A Large Amplitude DQV



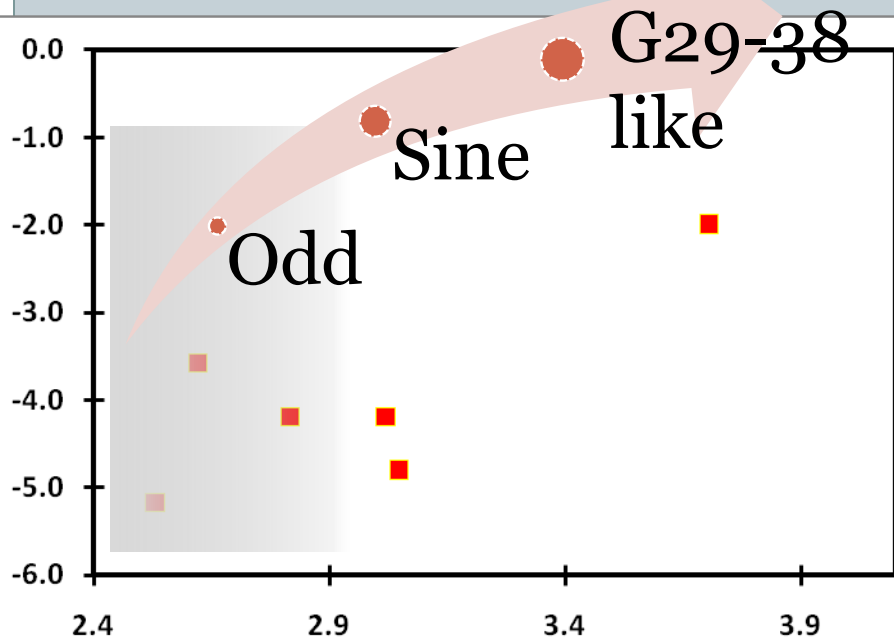
# That's Better.



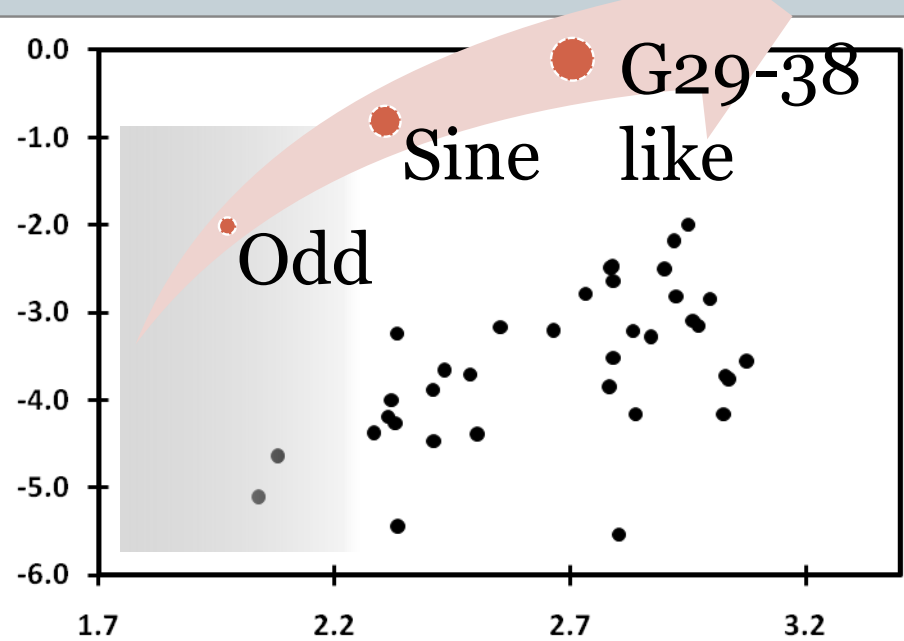
# Is there anything out there?



## DQVs



## ZZ Cetis



# In this story . . .

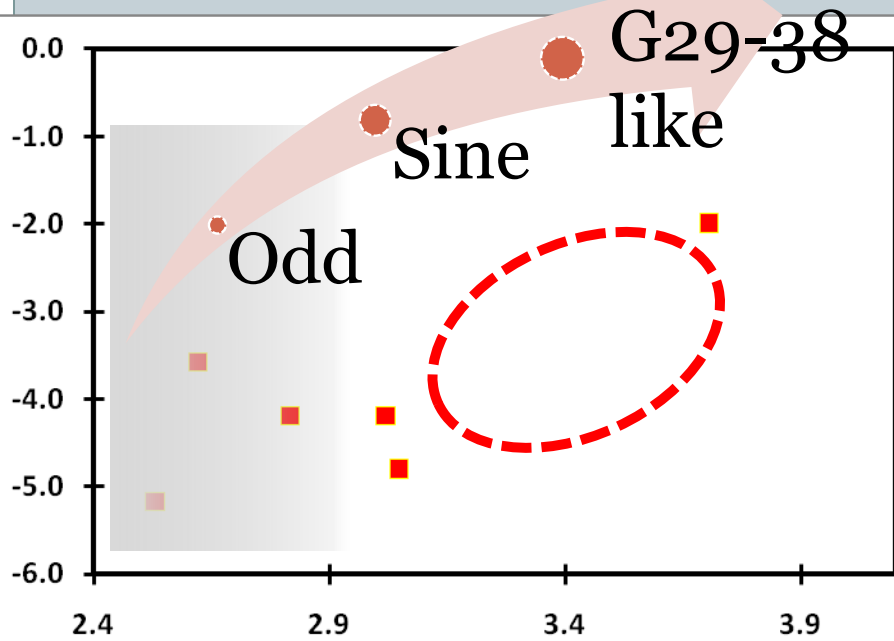


- The odd pulse shapes result from  $l > 1$ 
  - Chromatic amplitude differences
  - Rotational splitting differences
- Like the short-period DAVs, the short-period DQVs are
  - Lower amplitude
  - More Stable
  - Hotter
- We can expect the converse for the long-period DQVs
- What else? (Audience participation)

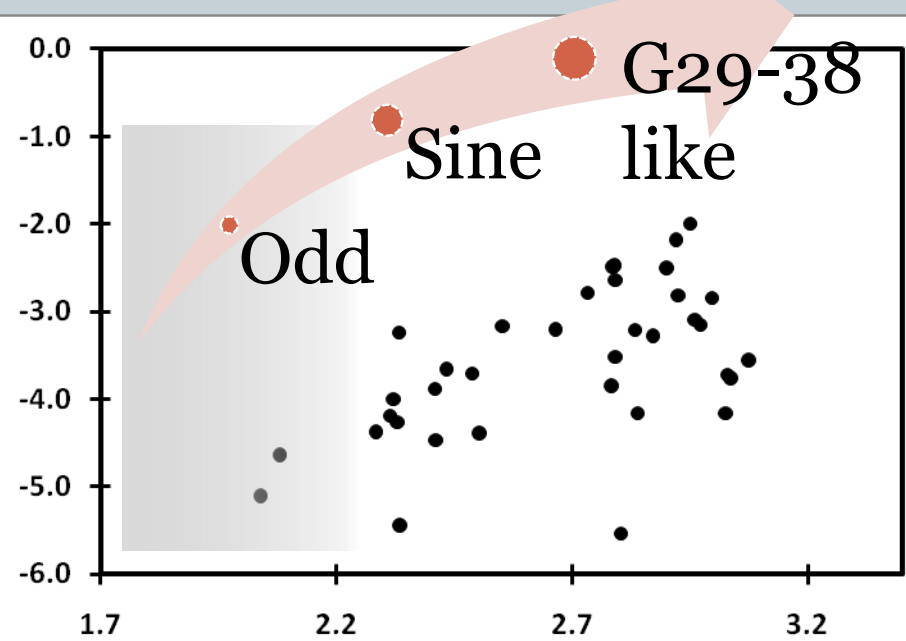
# THE BEGINNING

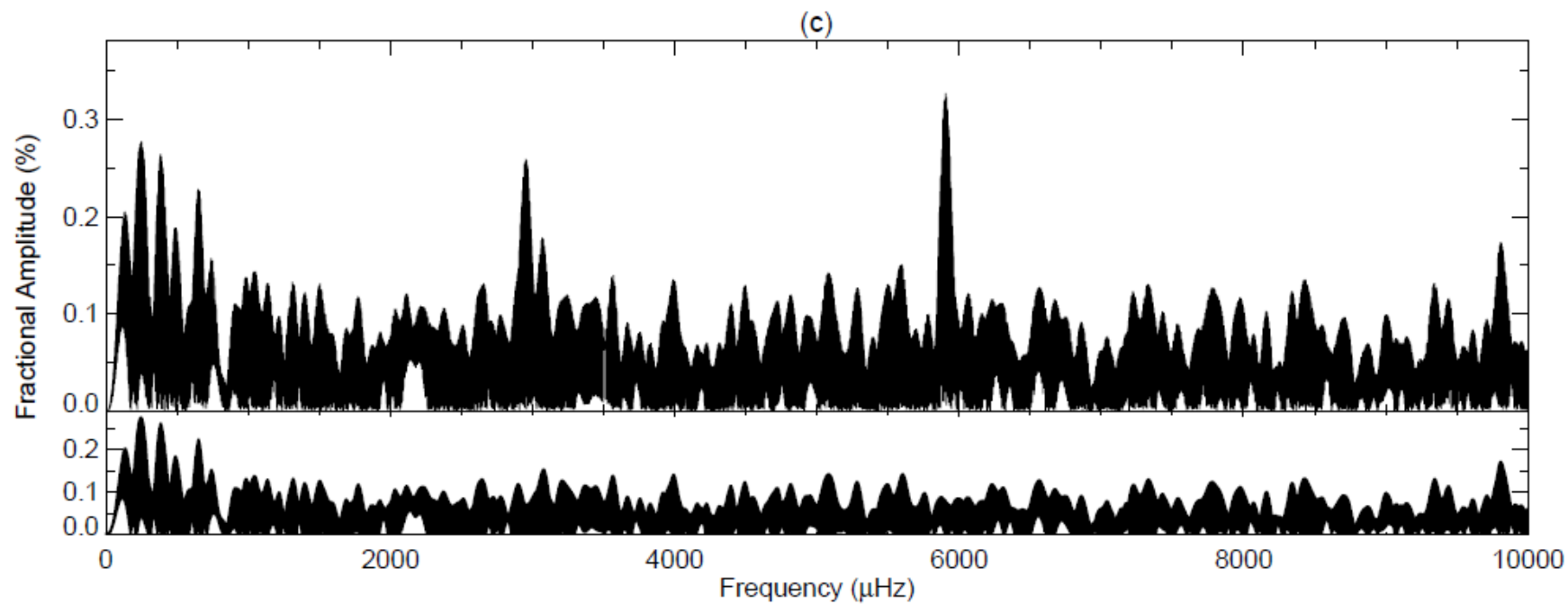
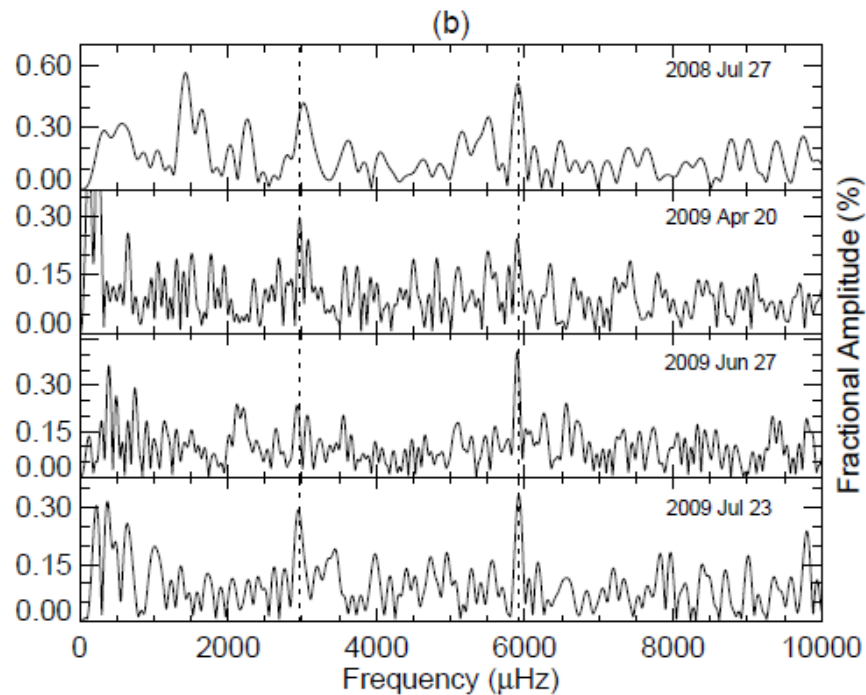
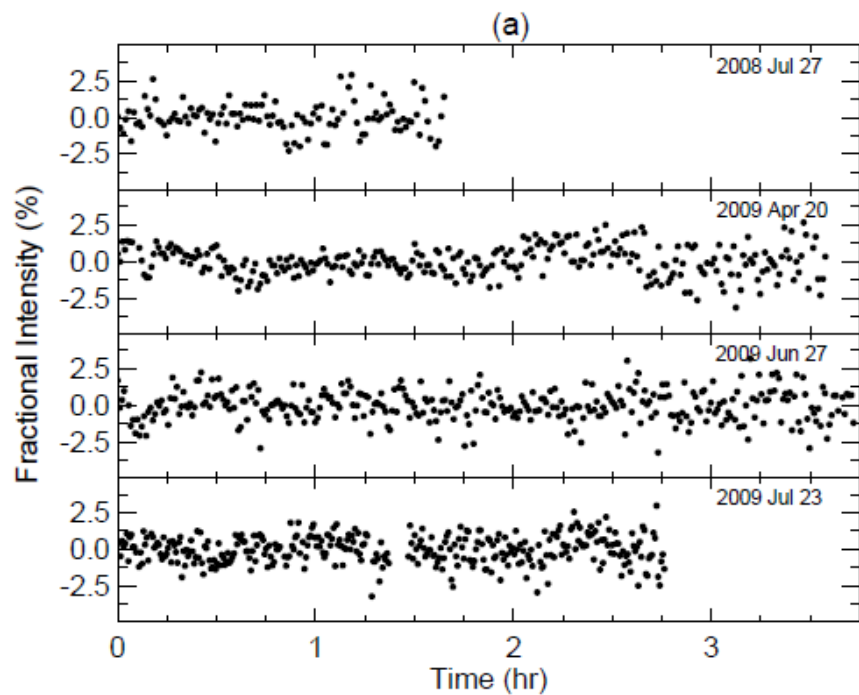


## DQVs



## ZZ Ceti





# DQ Big Spectrum

