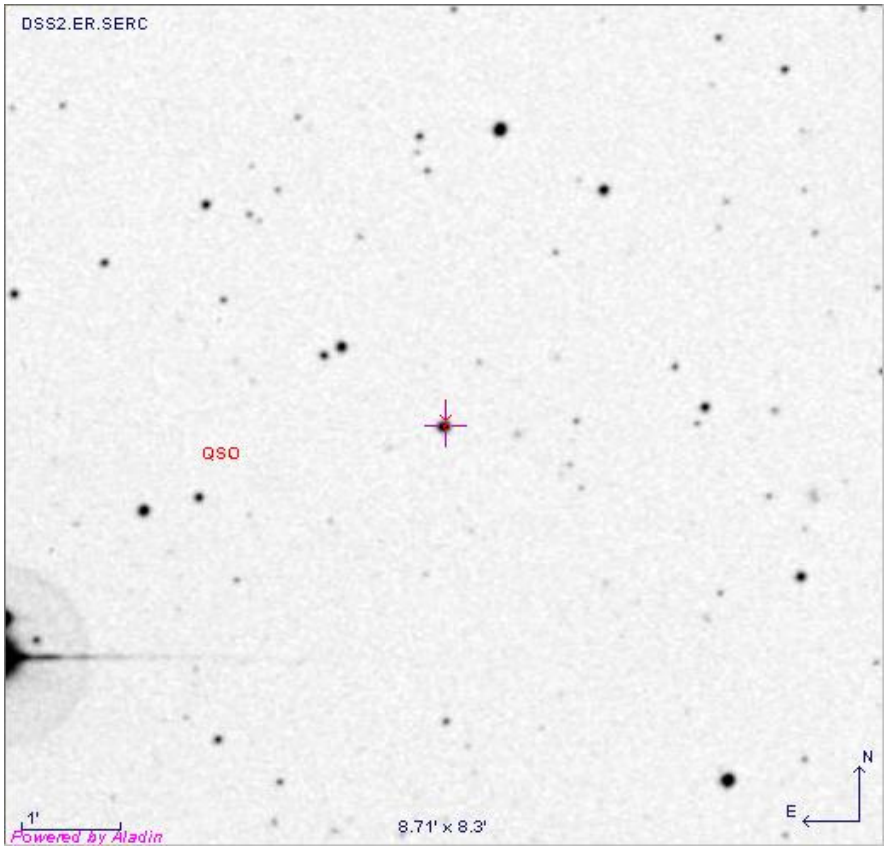
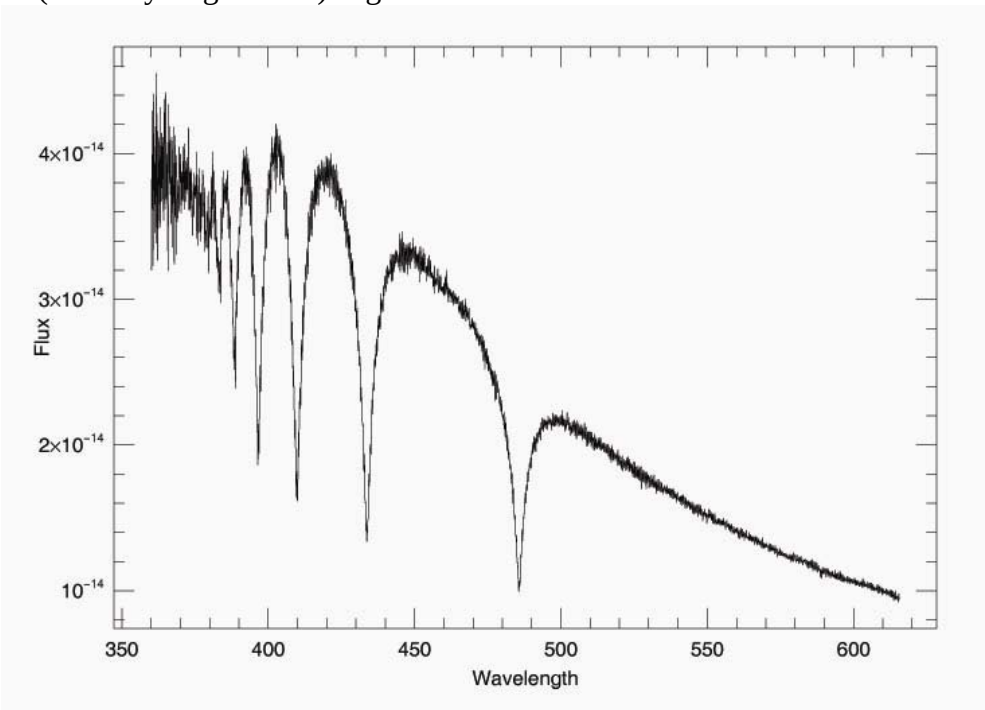
WD J1524-003

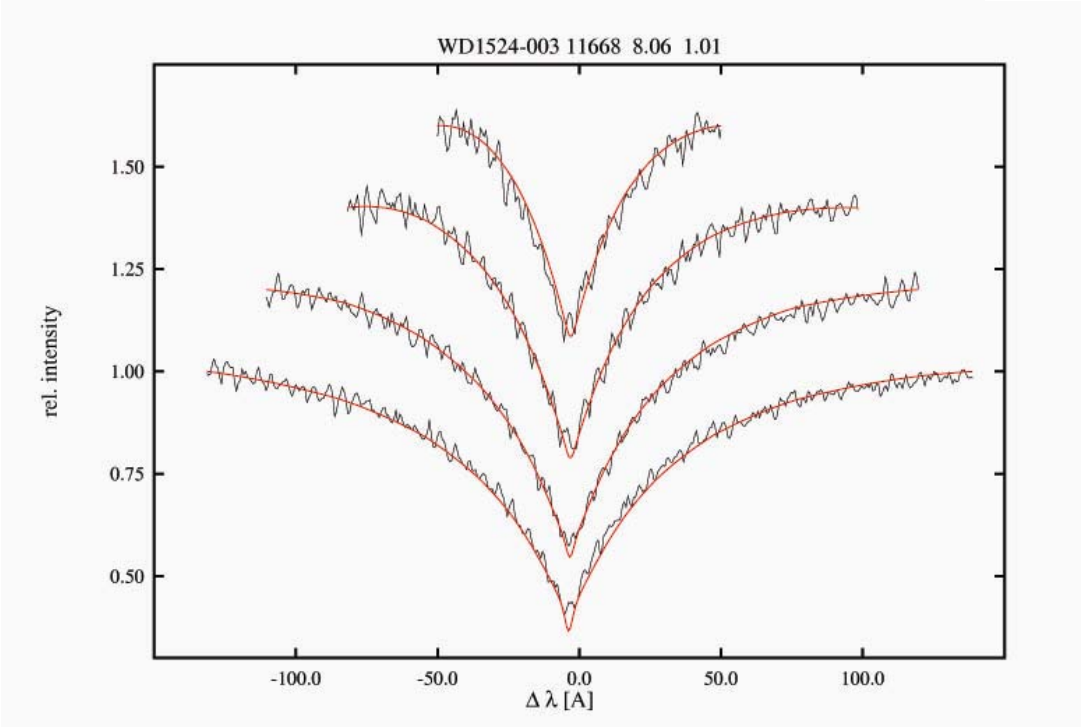
DAV
RA: 15:24:03.25
DEC: -00:30:22,.9 (2000)
J= 12.19
H=11.62
K=11.4 --- These numbers are brighter than expected because of the presence of a close, cool companion (from SDSS)
m(g) =16.03 for the white dwarf



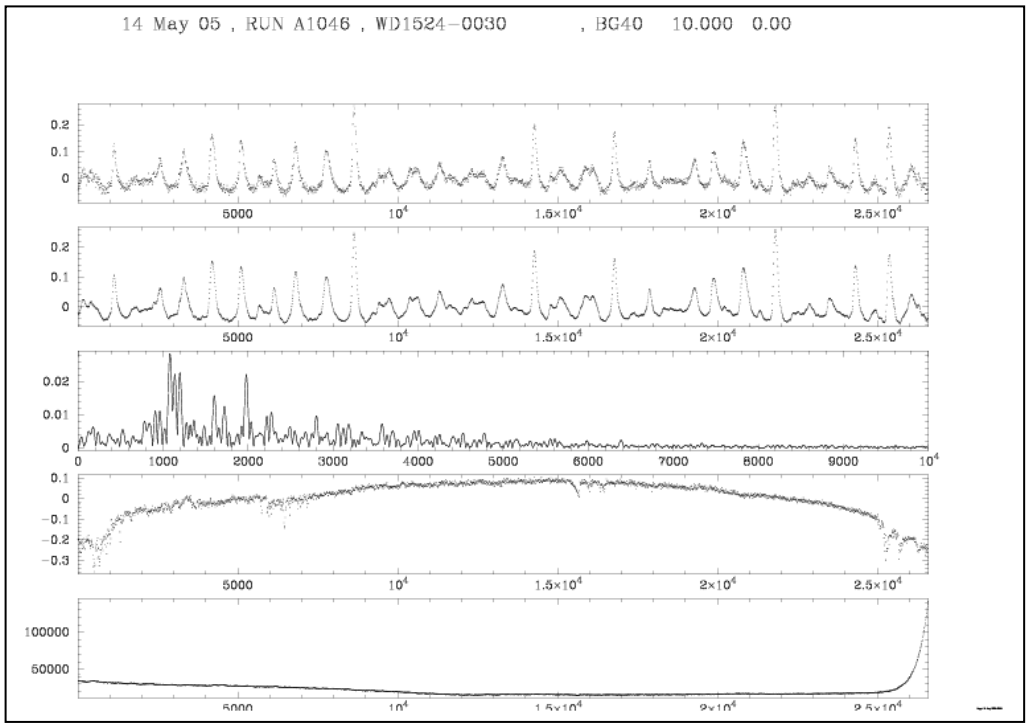
Finder chart = 8x8 arcmin

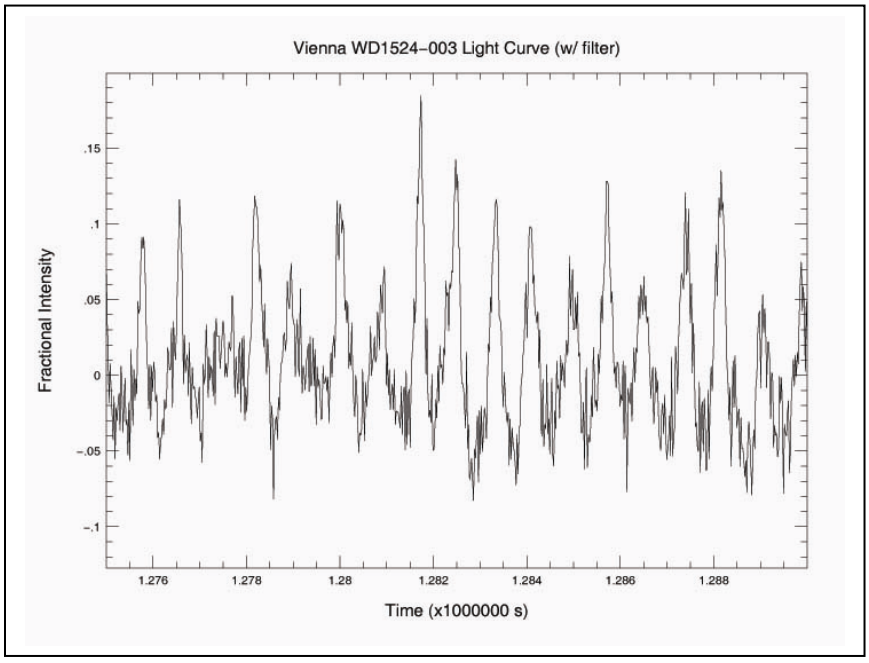
During our discussion last year, the chief objection to this star as a target in 2007 was the lack of an accurate temperature needed for Mike's light curve fitting. This problem has been resolved. We obtained a nice spectrum from SOAR, given below. We sent the spectrum to Detlev, and his preliminary estimate is Teff=11688±300 K, log g=8.06. The fit (to the hydrogen lines) is given below…





This star is very interesting for both Mike's light curve fitting and for asteroseismology. It is a large amplitude, nonlinear pulsator with multiple frequencies simultaneously excited. . The figure below gives a light curve from the McDonald 2.1m.





Since WD1524 is a large amplitude pulsator, it is possible to obtain good data from the small telescopes in the network. The light curve above is from Vienna (2007), using a BG40 filter.

We obtained a significant amount of data on this star in 2007, from McDonald, Vienna, and CTIO.

The reported frequencies (from the discover paper, Mukadam et al. 2004, ApJ, 607, 982)

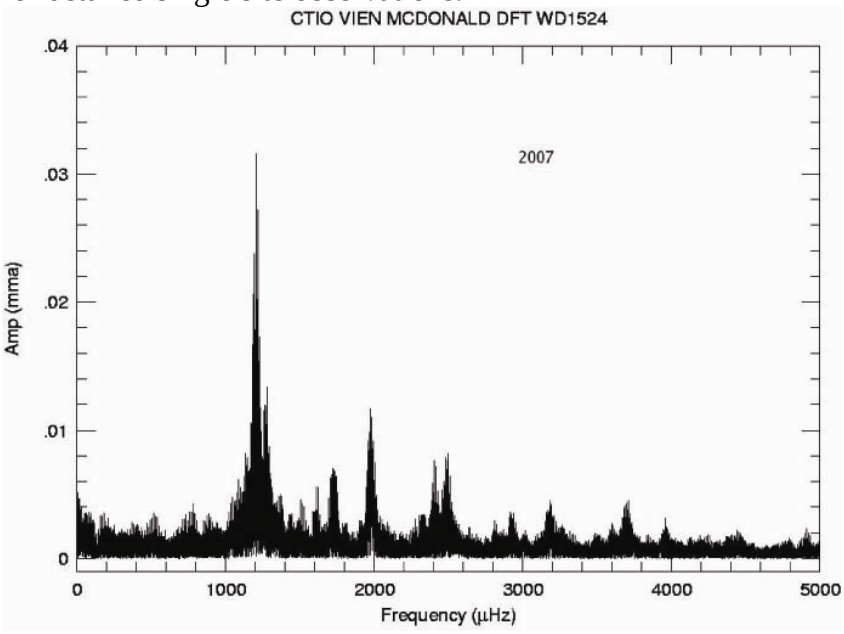
Frequency (microHz)	Period (sec)	Amplitude (mma)	Comments
1145.1	873.3	110.8	
1393.7	717.5	28.3	
2005.6	498.6	21.6	
3918.5	255.2	17.9	

From our 2007 data, we find:

Frequency (μHz)	Period (sec)	Amp (mma)	Comments
1189.90	840.4	7.7	F5?, F1?
1200.34	833.1	31.4	F1, not a single frequency
1217.14	821.6	7.5	F1?
1275.61	783.9	6.1	F3?
1281.48	780.3	9.9	F3?
1610.73	620.8	6.2	F5
1728.25	578.6	6.9	F4, complex
1970.73	507.4	11.7	F2?
1978.11	505.5	10.5	F2?
1987.37	503.2	7.4	F2? multiplet

*These amplitudes are not corrected for the presence of the companion

From our 2007 data, compared with the discovery data, we can say that this star changes its excited modes in a manner reminiscent of GD358. The large number of modes combined with the presence of multiplets argues that this star would be a difficult target for detailed single site observations.



Here are the pros and cons for a 2009 run on WD1524, as I see them:

Pros:

1) Nonlinear light curve makes this star a good target for light curve fitting
2) Presence of simultaneously excited modes makes this star an interesting target for asteroseismology
3) Target is bright enough and large enough amplitude for small telescopes in the network
4) WD1524 is equatorial, so it can be observed by everyone.
5) The complexity of the FT (multiplets, lots of modes, changing modes, combinations) means that this would be a difficult target for single site observations.
6) The preliminary temperature and log g of WD1524 fits in well with our plan to map the instability strip in temperature (and mass). We have observations on quite a few cool objects and two hot ones.

WD	Teff	Log g
WD1524	11700	8.06
EC14012	11900	M=0.7
Ross 808	11160	8.04
G38-29	11180	M=0.55
G29-38	11820	M=0.7
GD154	11180	M=0.7

Cons:

1) Presence of companion star makes the reductions/analysis more difficult than a single star. However, this is not an insurmountable problem. The use of the BG40 filter will help, and we can correct the amplitudes for the presence of the companion. Most sites will not be able to resolve the pair.
2) Nearby bright star may be a problem for some sites. However, this did not cause a serious issue with EC14012 in April, which has a bright star even closer.