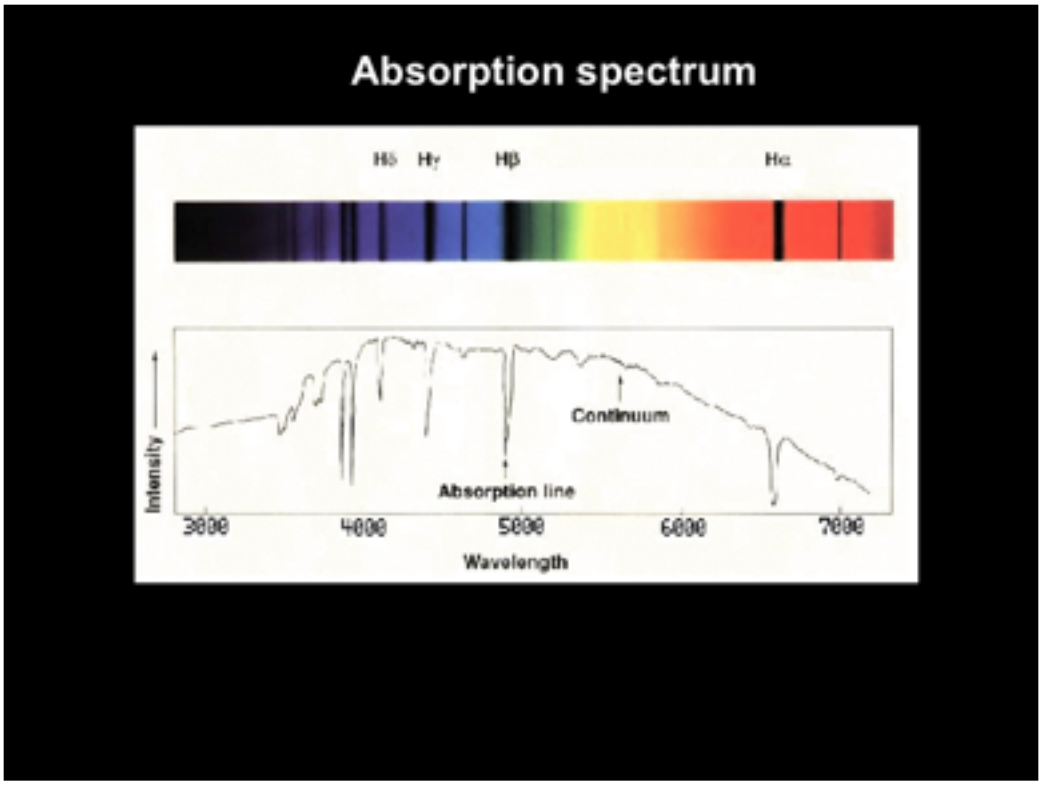
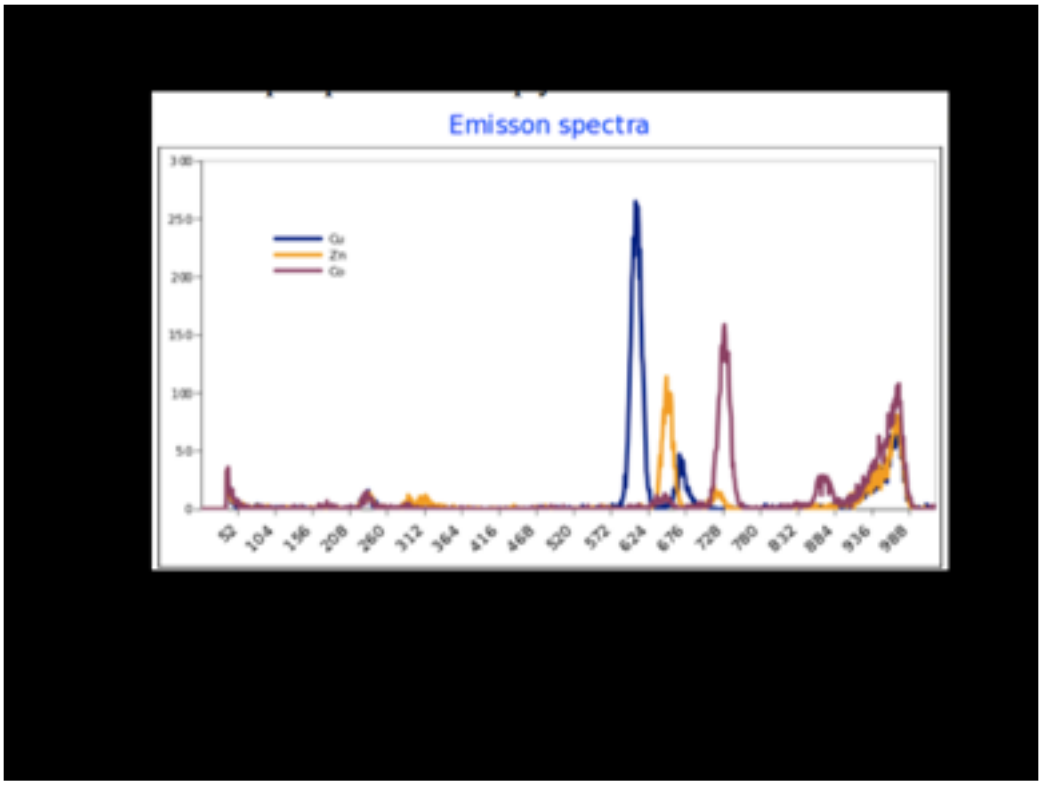
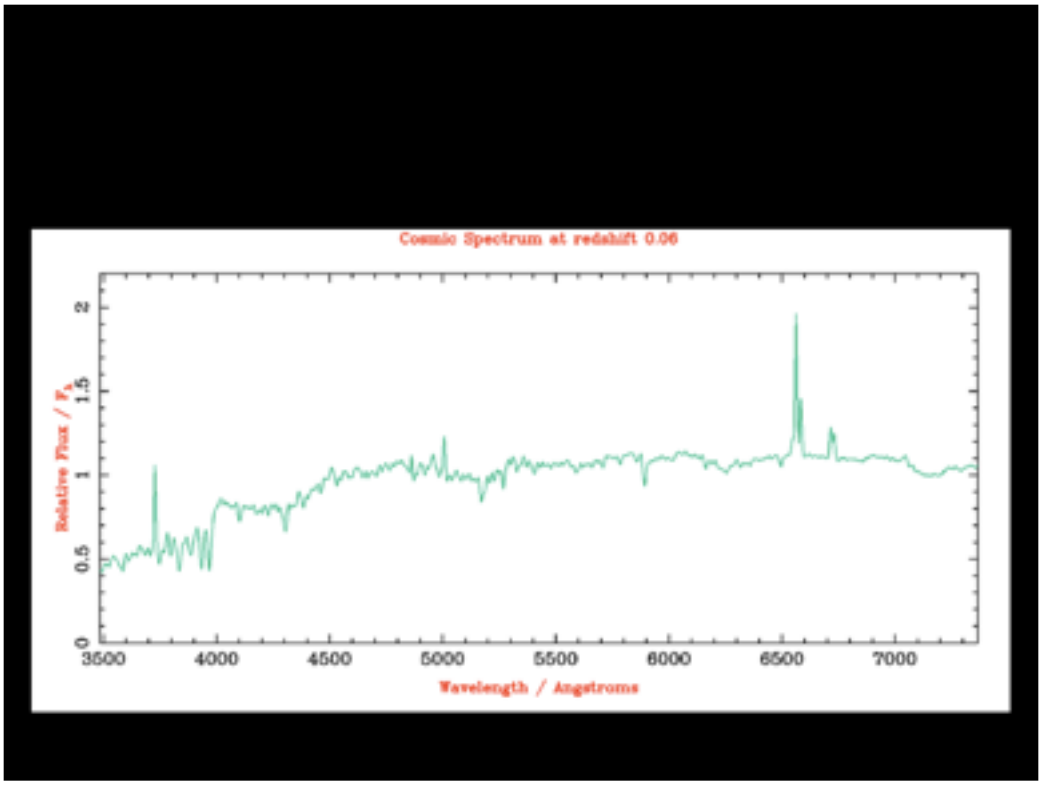


Today we don't look at the beautiful colorful images of spectra. W use GRAPHS. Even though it is not as pretty, There is more information we can get from a graph. Like how much of a particular type of light is missing, or which color light the object is giving off more of or less of.

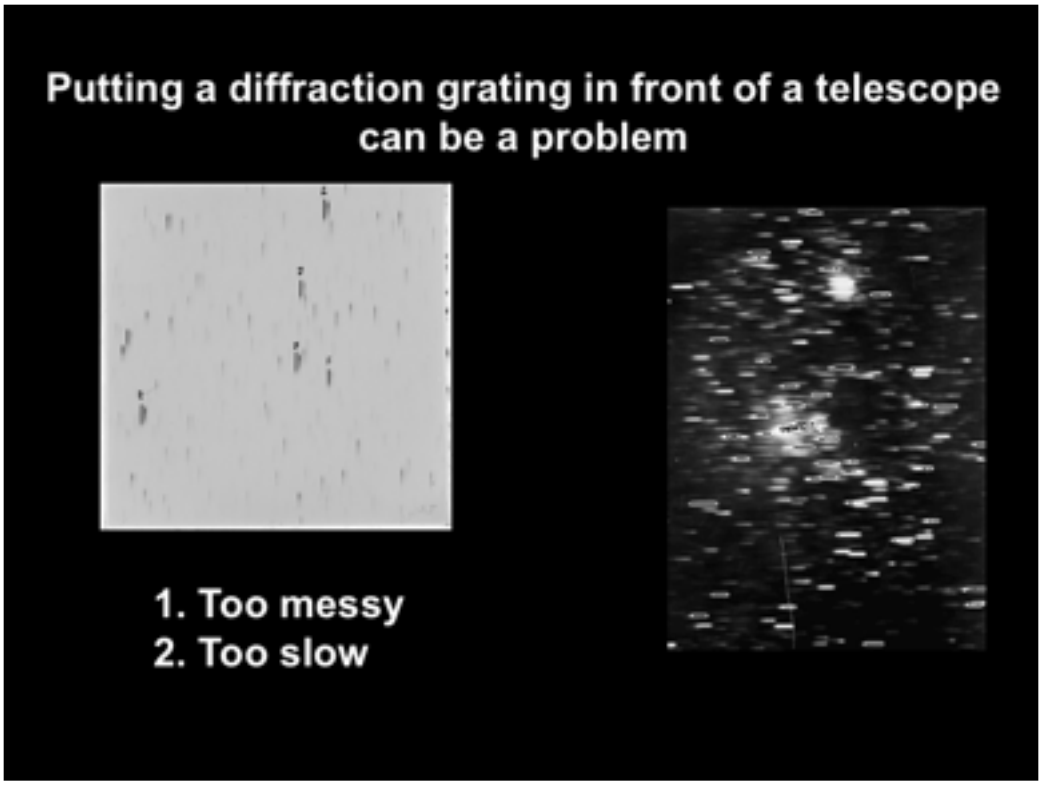
An absorption spectrum is produced when a continuum passes through "cooler" gas. Photons of the appropriate energies are absorbed by the atoms in the gas. Although the photons may be re-emitted, they are effectively removed from the beam of light, resulting in a dark or *absorption* feature. The atmospheres of stars act as a cooler blanket around the hotter interior of a star so that typical stellar spectra are absorption spectra.



Spectral graphs can tell us how much more of one light is emitted than another.

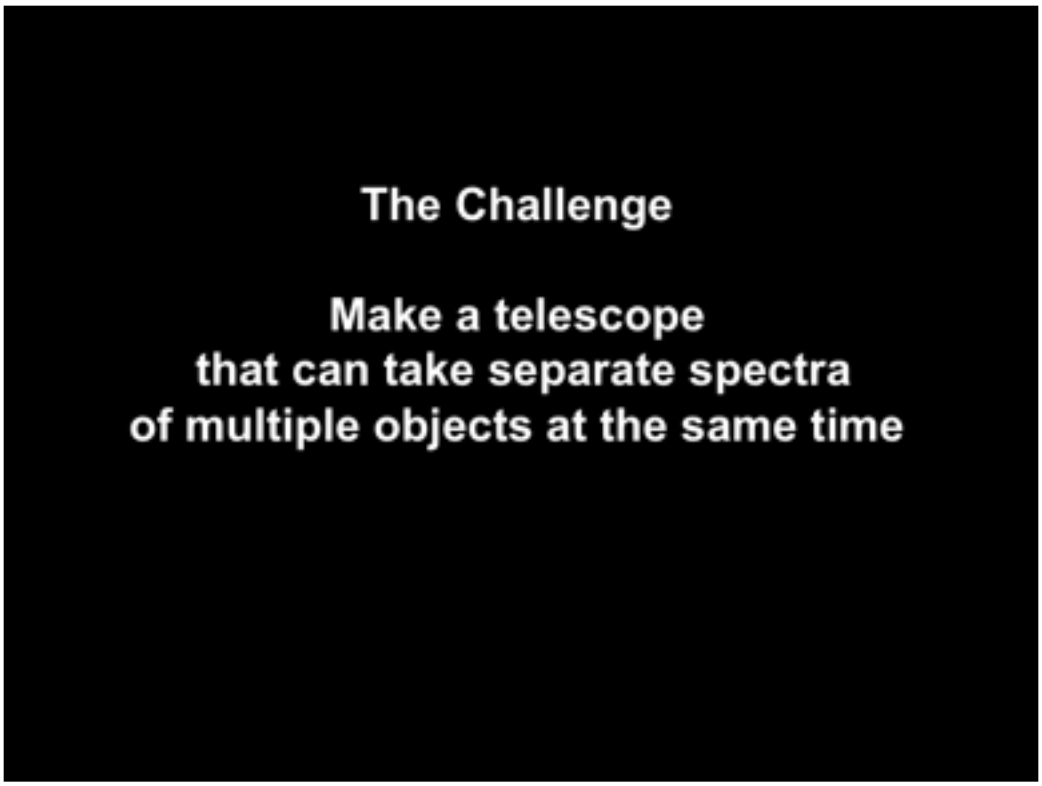


Some things are combinations. Sometimes it is tricky to figure out what is the background, the continuum. SDSS computers estimate this for you.



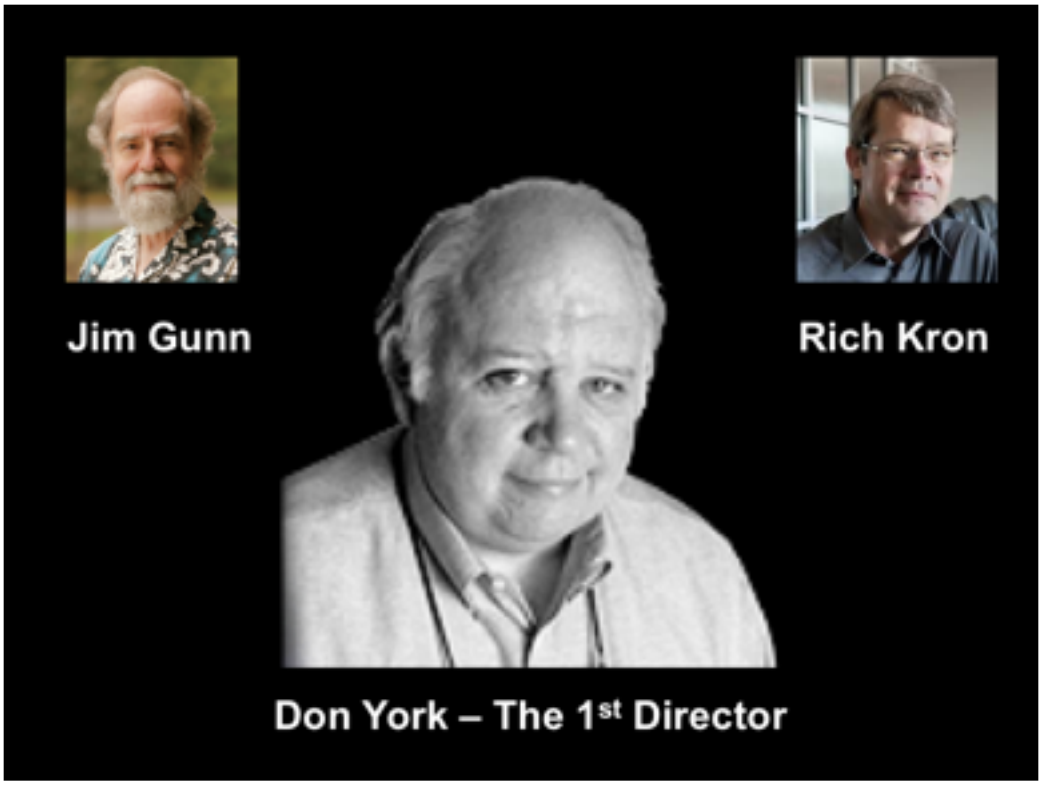
Take a lot of spectra at once – messy

Take one at a time spectra - slow



We want to get a rainbow for each star or galaxy

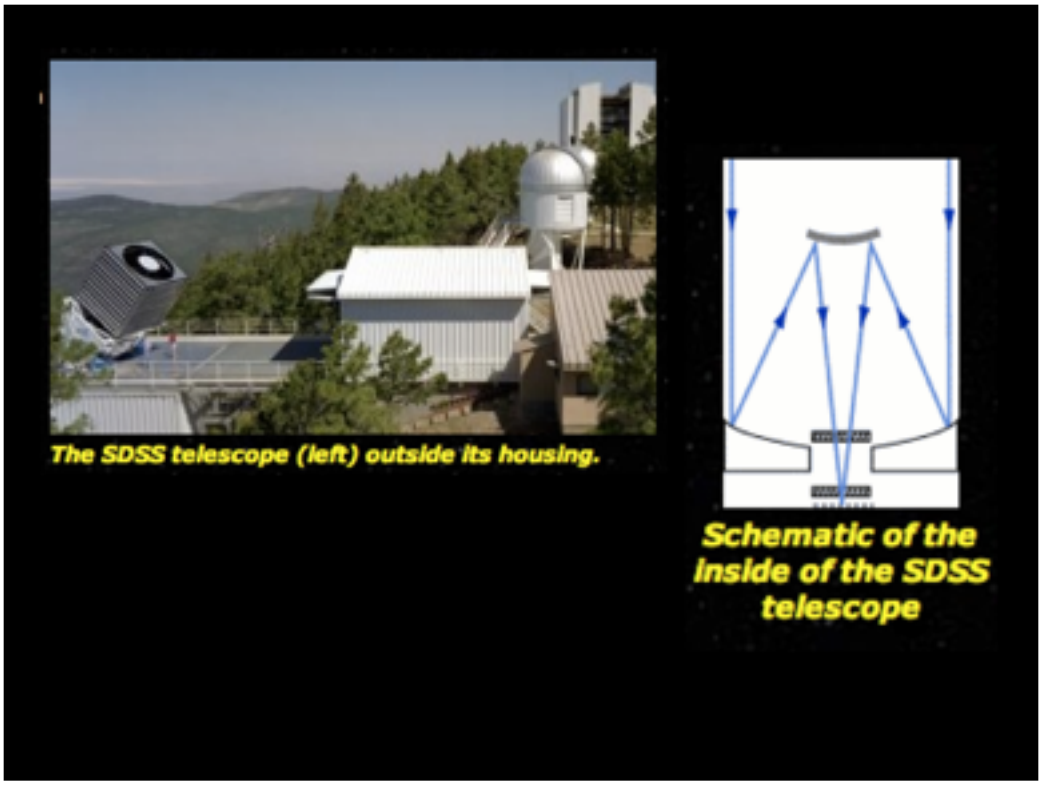
3 guys came up with an idea for a
telescope that could
take separate spectra
of multiple objects
at the same time



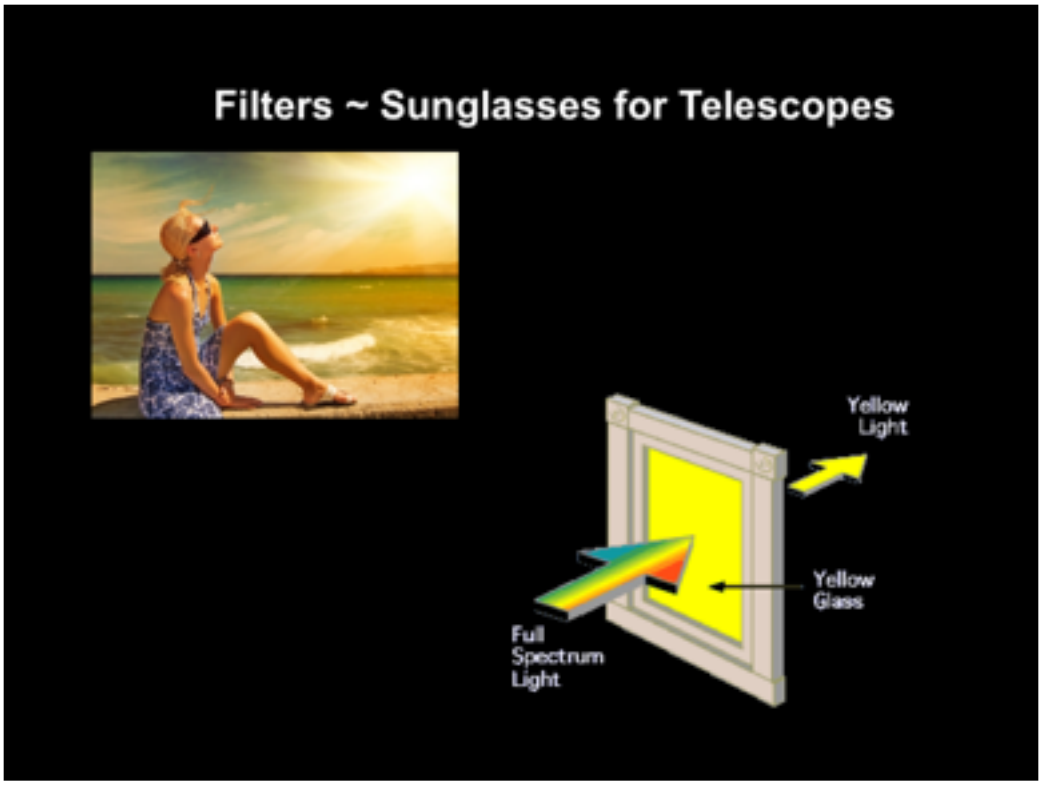
3 astronomers came up with a NEW idea to get around the problem with spectra

There she is!!!

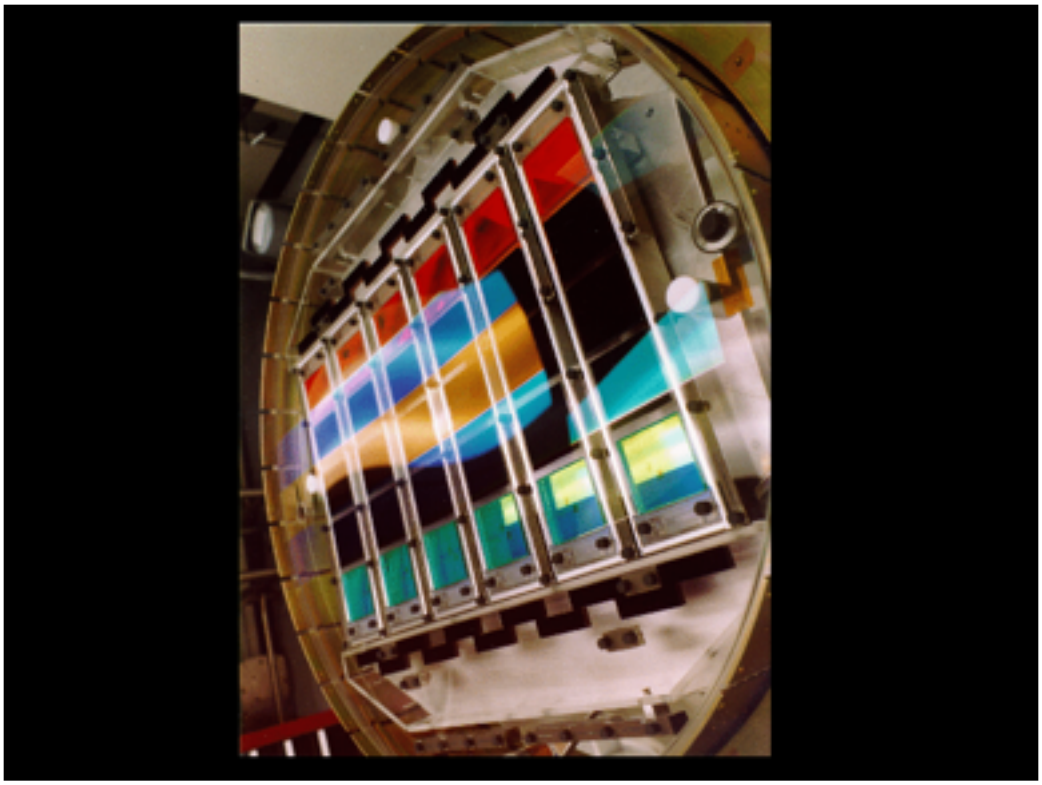
There are other telescopes at Apache Point. Point out sdss.



The building rolls away. Point out where the camera and the spectrograph go in schematic.

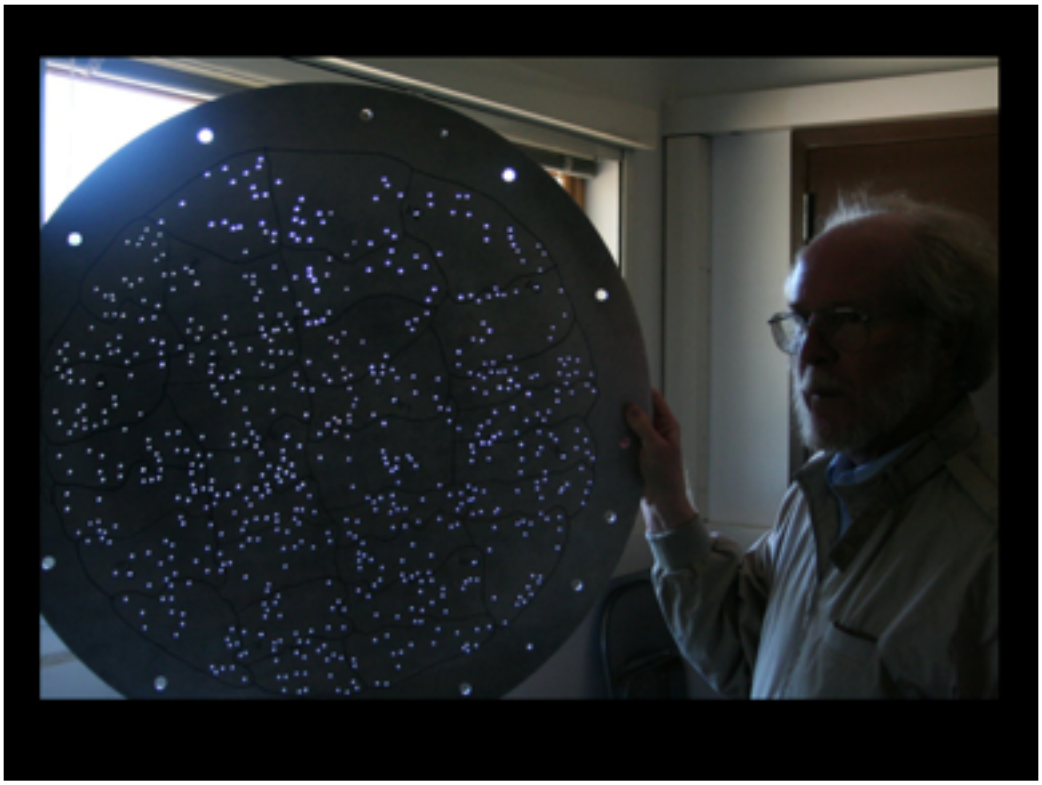


Only one kind of light is let through a filter. You can get a good measurement of one particular type of light.

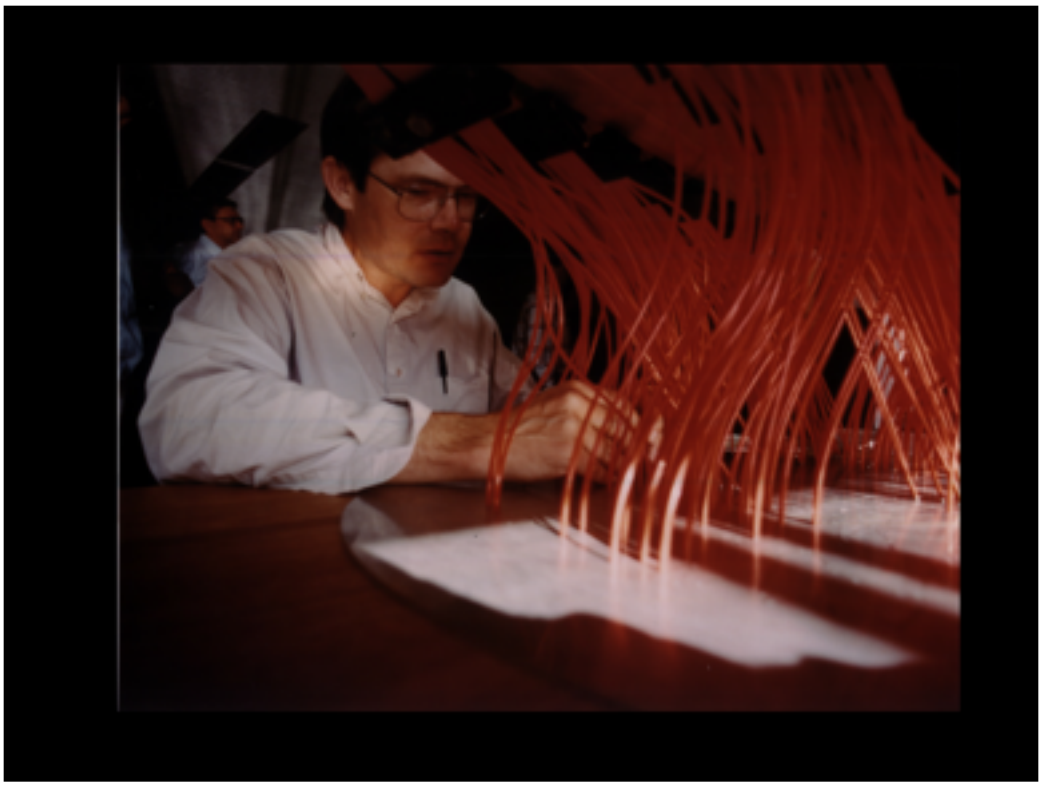


SDSS's filters or sunglasses. Five colors taken at once. The image is so large you have to have several of each color to cover the portion of sky you are interested in.

You decide which objects you want spectra of.

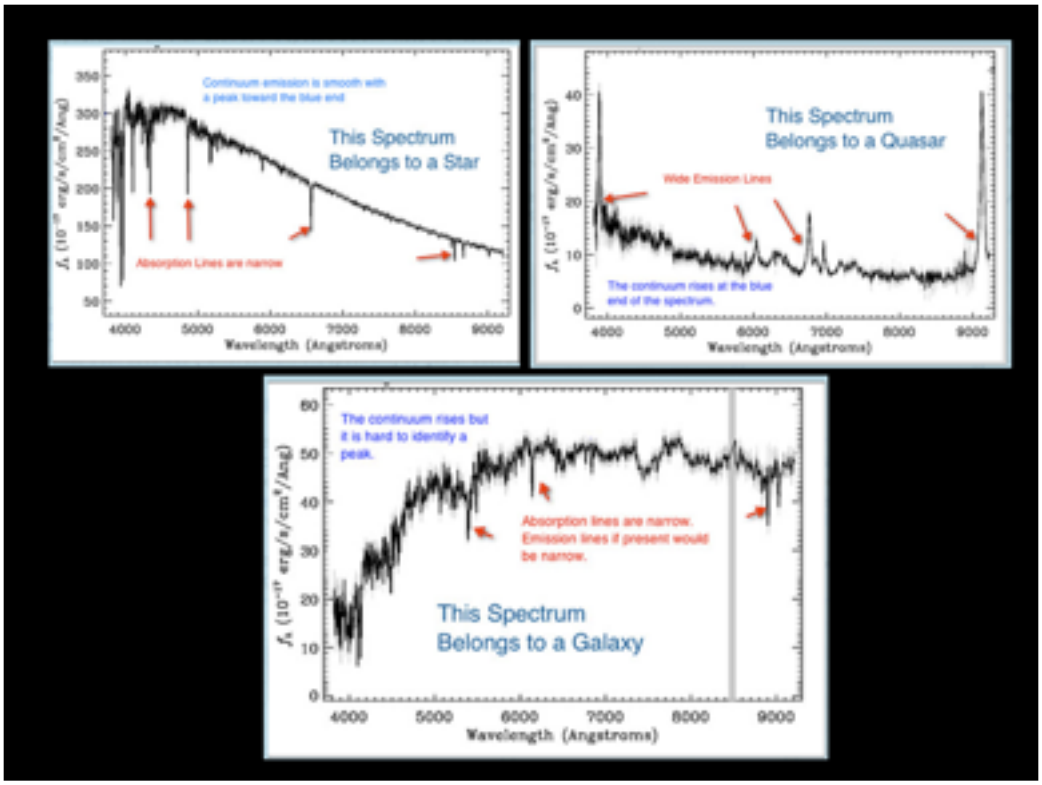


Then you drill a hole at exactly that spot which will capture the light from that object ONLY.



Fibers have to be plugged in by hand. A crew in New Mexico does this.

This whole thing is what gets attached to the telescope.



Examples of spectra

Eman and I holding one plate. Point out fiber numbers on Don’t plate.

A view through the night. Watch for the switch from the camera (to take images) to the plates (to take spectra).

Princeton – images

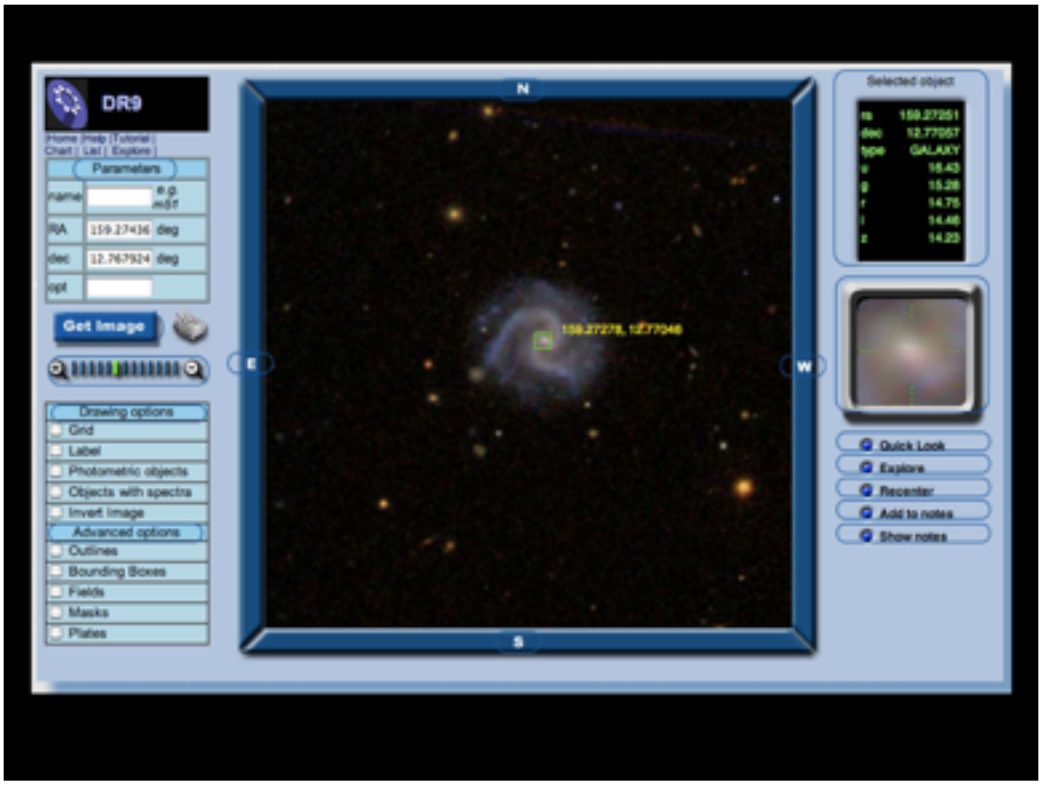
U of C – spectra

Fermilab – coordinated

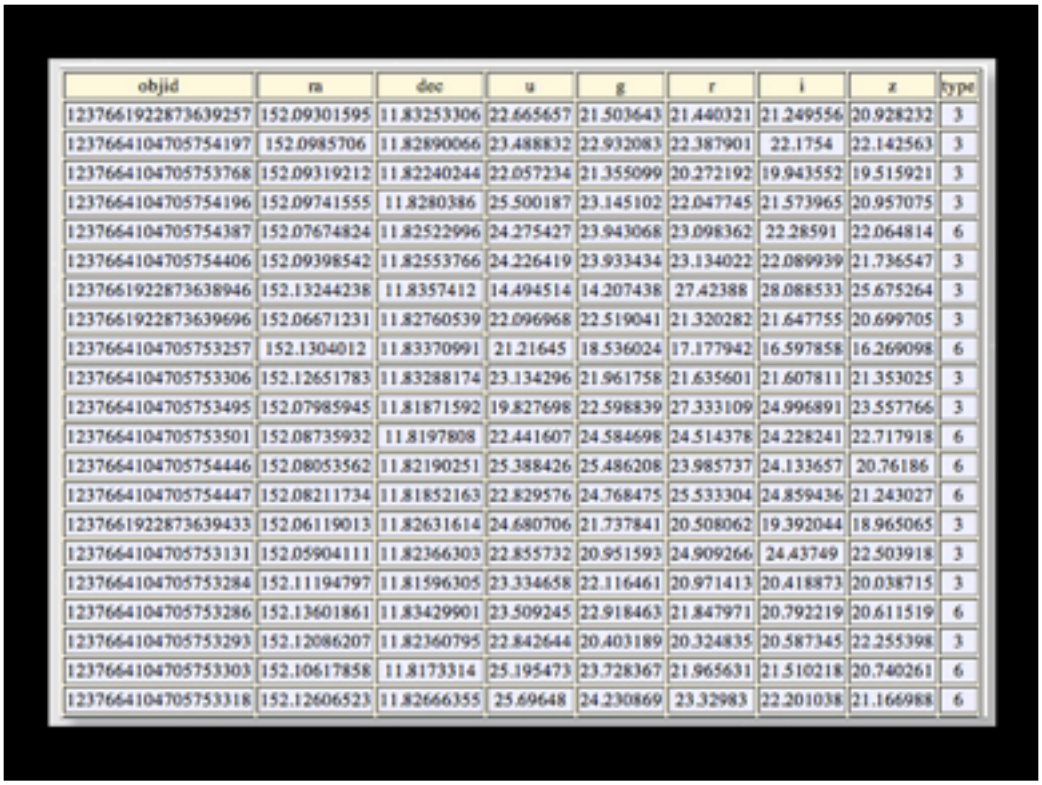
John Hopkins – Database for access

Naval Observatory – software development ???

Kate's video. Good explanation of data.



SDSS images – Navigate page. For those of us who like looking at pretty pictures.



objid	ra	dec	u	g	r	i	z	type
1237661922873639257	152.09301595	11.83253306	22.665657	21.503643	21.440321	21.249556	20.928232	3
1237664104705754197	152.0985706	11.82890066	23.488832	22.932083	22.387901	22.1754	22.142563	3
1237664104705753768	152.09319212	11.82240244	22.057234	21.355099	20.272192	19.943552	19.515921	3
1237664104705754196	152.09741555	11.8280386	25.500187	23.145102	22.047745	21.573965	20.957075	3
1237664104705754387	152.07674824	11.82522996	24.275427	23.943068	23.098362	22.28591	22.064814	6
1237664104705754406	152.09398542	11.82553766	24.226419	23.933434	23.134022	22.089939	21.736547	3
1237661922873638946	152.13244238	11.8357412	14.494514	14.207438	27.42388	28.088533	25.675264	3
1237661922873639696	152.06671231	11.82760539	22.096968	22.519041	21.320282	21.647755	20.699705	3
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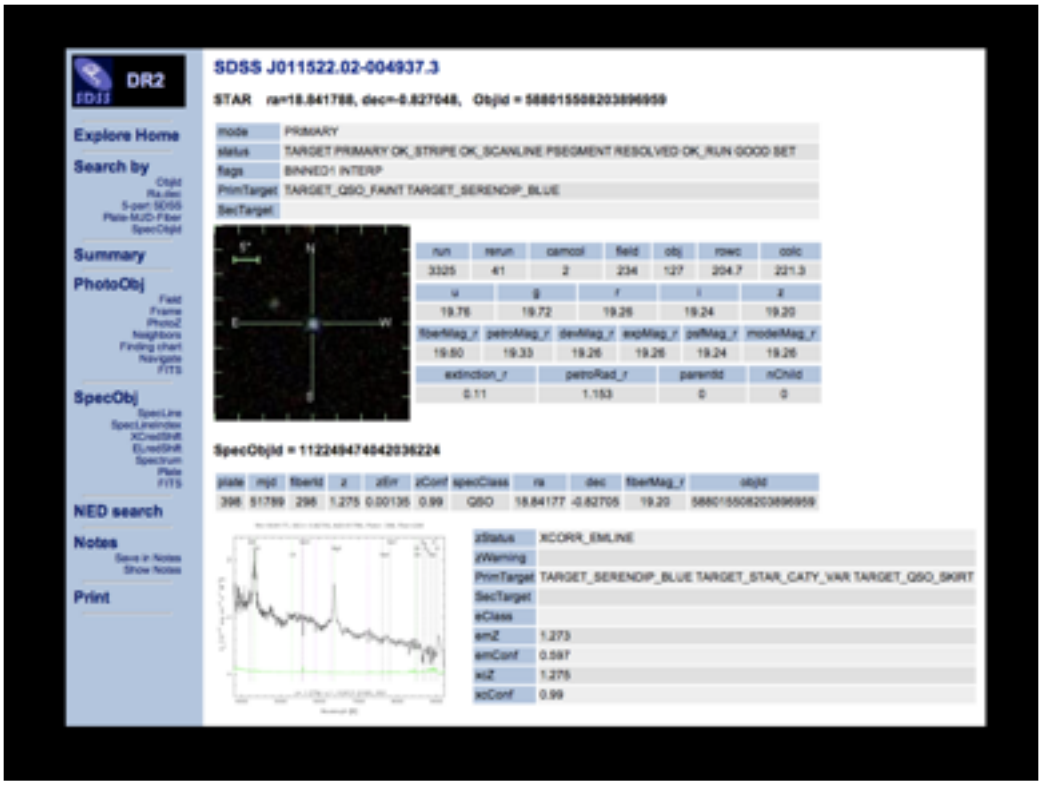
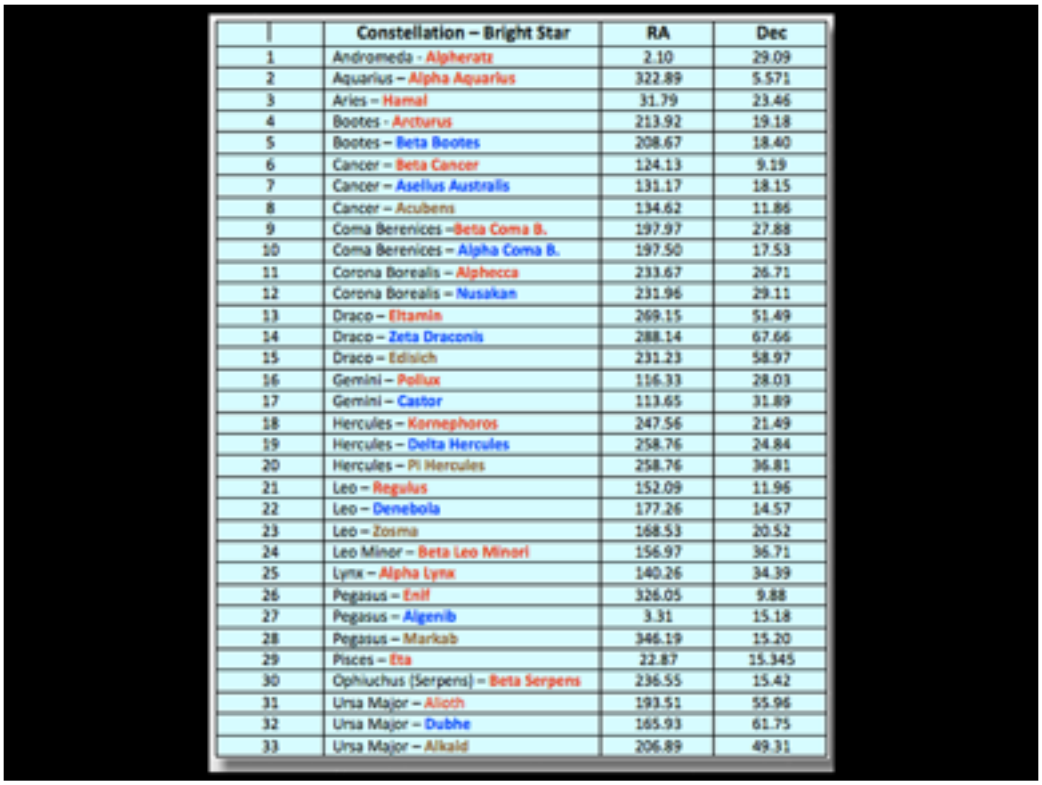
1237664104705753306	152.12651783	11.83288174	23.134296	21.961758	21.635601	21.607811	21.353025	3
1237664104705753495	152.07985945	11.81871592	19.827698	22.598839	27.333109	24.996891	23.557766	3
1237664104705753501	152.08735932	11.8197808	22.441607	24.584698	24.514378	24.228241	22.717918	6
1237664104705754446	152.08053562	11.82190251	25.388426	25.486208	23.985737	24.133657	20.76186	6
1237664104705754447	152.08211734	11.81852163	22.829576	24.768475	25.533304	24.859436	21.243027	6
1237661922873639433	152.06119013	11.82631614	24.680706	21.737841	20.508062	19.392044	18.965065	3
1237664104705753131	152.05904111	11.82366303	22.855732	20.951593	24.909266	24.43749	22.503918	3
1237664104705753284	152.11194797	11.81596305	23.334658	22.116461	20.971413	20.418873	20.038715	3
1237664104705753286	152.13601861	11.83429901	23.509245	22.918463	21.847971	20.792219	20.611519	6
1237664104705753293	152.12086207	11.82360795	22.842644	20.403189	20.324835	20.587345	22.255398	3
1237664104705753303	152.10617858	11.8173314	25.195473	23.728367	21.965631	21.510218	20.740261	6
1237664104705753318	152.12606523	11.82666355	25.69648	24.230869	23.32983	22.201038	21.166988	6

SDSS lists – SDSS can give you lists of things (magnitudes here). For those who like the numbers.



Each object has its own page with info – image, magnitudes, spectra, redshift, etc.

You can get to it from either the images (Navigate) or the lists (plate tools)



	Constellation – Bright Star	RA	Dec
1	Andromeda - Alpheratz	2.10	29.09
2	Aquarius – Alpha Aquarius	322.89	5.571
3	Aries – Hamal	31.79	23.46
4	Bootes - Arcturus	213.92	19.18
5	Bootes – Beta Bootes	208.67	18.40
6	Cancer – Beta Cancer	124.13	9.19
7	Cancer – Asellus Australis	131.17	18.15
8	Cancer – Acubens	134.62	11.86
9	Coma Berenices –Beta Coma B.	197.97	27.88
10	Coma Berenices – Alpha Coma B.	197.50	17.53
11	Corona Borealis – Alphecca	233.67	26.71
12	Corona Borealis – Nusakan	231.96	29.11
13	Draco – Eltanin	269.15	51.49
14	Draco – Zeta Draconis	288.14	67.66
15	Draco – Edisich	231.23	58.97
16	Gemini – Pollux	116.33	28.03
17	Gemini – Castor	113.65	31.89
18	Hercules – Kornephoros	247.56	21.49
19	Hercules – Delta Hercules	258.76	24.84
20	Hercules – Pi Hercules	258.76	36.81
21	Leo – Regulus	152.09	11.96
22	Leo – Denebola	177.26	14.57
23	Leo – Zosma	168.53	20.52
24	Leo Minor – Beta Leo Minori	156.97	36.71
25	Lynx – Alpha Lynx	140.26	34.39
26	Pegasus – Enif	326.05	9.88
27	Pegasus – Algenib	3.31	15.18
28	Pegasus – Markab	346.19	15.20
29	Pisces – Eta	22.87	15.345
30	Ophiuchus (Serpens) – Beta Serpens	236.55	15.42
31	Ursa Major – Alioth	193.51	55.96
32	Ursa Major – Dubhe	165.93	61.75
33	Ursa Major – Alkaid	206.89	49.31

Have kids investigate plates through constellations? ??