Lab 6

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1 IRAS Sources around KR 140

Output table from ds9 searching around $2^h20^m12.589^s$ $61°6'3.255''$ within a $15'$ rectangle filtered for IRAS sources.

RA (deg)	DEC (deg)	Main ID
02 15 39.7	+60 45 58	02156+6045
02 15 42.8	+60 53 28	02157+6053
02 16 05.1	+60 57 38	02160+6057
02 16 33.0	+60 53 29	02165+6053
02 16 50.7	+60 52 12	02168+6052
02 17 08.7	+60 58 18	02171+6058
02 17 26.0	+60 52 17	02174+6052

The IDs of these sources were then used in a VizieR query of the IRAS catalogue of Point Sources, Version 2.0 (IPAC 1986).

```
-- output format : csv
SELECT "II/125/main".IRAS,
"II/125/main".RA1950,
"II/125/main".DE1950,
"II/125/main".Fnu_12,
"II/125/main".e_Fnu_12,
"II/125/main".Fnu_25,
"II/125/main".e_Fnu_25,
"II/125/main".Fnu_60,
"II/125/main".e_Fnu_60,
"II/125/main".Fnu_100,
"II/125/main".e_Fnu_100
FROM "II/125/main"
WHERE "II/125/main".IRAS LIKE '02156+6045' OR
"II/125/main".IRAS LIKE '02157+6053' OR
"II/125/main".IRAS LIKE '02160+6057' OR
"II/125/main".IRAS LIKE '02165+6053' OR
"II/125/main".IRAS LIKE '02168+6052' OR
"II/125/main".IRAS LIKE '02171+6058' OR
"II/125/main".IRAS LIKE '02174+6052'
```

From this query the following table was created. Note the errors are whole number percentage errors (ie 25 means 25% error on the given measurement)

IRAS	$F_{\nu,12}$	$\epsilon_{F_{\nu,12}}$	$F_{\nu,25}$	$\epsilon_{F_{\nu,25}}$	$F_{\nu,60}$	$\epsilon_{F_{\nu,60}}$	$F_{\nu,100}$	$\epsilon_{F_{\nu,100}}$
"02174+6052"	0.8799	6	2.363	6	32.01	0	127.9	0
"02156+6045"	0.2729	0	0.3631	13	3.601	18	44.14	0
"02157+6053"	0.8217	16	1.309	13	21.8	16	215.1	0
"02168+6052"	2.157	24	2.179	22	32.01	0	127.9	14
"02165+6053"	0.3451	25	1.719	15	1.85	0	215.1	0
"02171+6058"	0.3587	15	1.84	6	11.61	10	63.52	17
"02160+6057"	2.403	16	2.99	20	47.37	20	215.1	16

From these values I created a color plot, where

$$x = \log_{10} \frac{F_{\nu,60}}{F_{\nu,100}} \tag{1}$$

$$\sigma_x = \frac{1}{100 \ln 10} \sqrt{\epsilon^2_{F_{\nu,60}} + \epsilon^2_{F_{\nu,100}}} \tag{2}$$

$$y = \log_{10} \frac{F_{\nu,25}}{F_{\nu,12}} \tag{3}$$

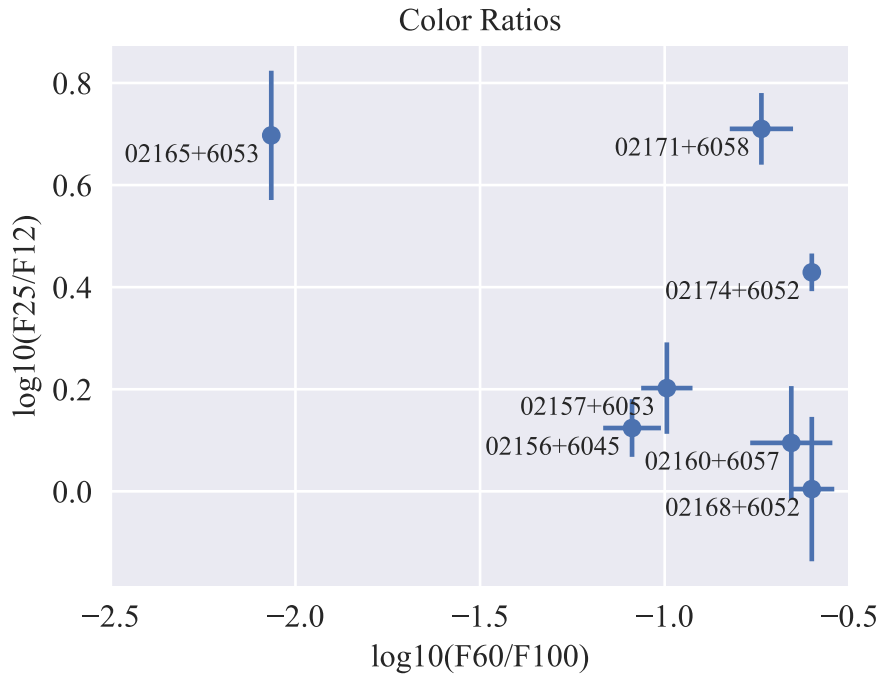
$$\sigma_y = \frac{1}{100 \ln 10} \sqrt{\epsilon^2_{F_{\nu,25}} + \epsilon^2_{F_{\nu,12}}} \tag{4}$$

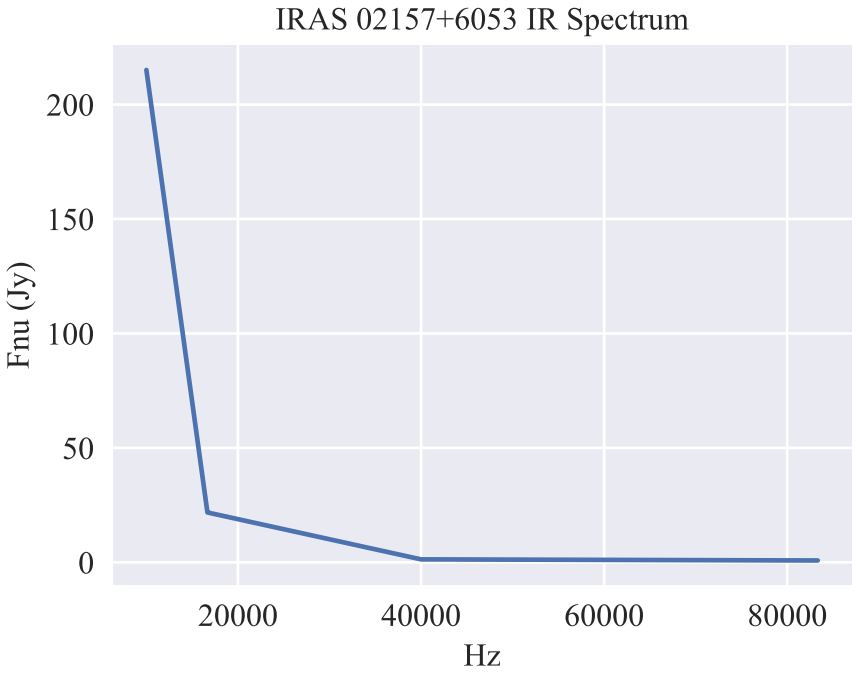
I also made a spectrum plot shown in . Using this, I integrated to find the total infrared flux to be 239 jy. Using this and an assumed distance of 2.3 kpc I can estimate the integrated flux over the whole star and find its luminosity using Equation 5. The luminosity I have estimated is 7.50×10^{18} W or 1.95×10^{-8} $L_\odot$

$$L = 4\pi D^2 F \tag{5}$$

2 KR 140 in the submm

In the submm photo there is a clump around $i = +133.436, b = -0.022$ that does not correspond with any of the IRAS sources


Color Ratios
log10(F25/F12)
log10(F60/F100)
0.8
0.6
0.4
0.2
0.0
−2.5
−2.0
−1.5
−1.0
−0.5
02165+6053
02171+6058
02174+6052
02157+6053
02156+6045
02160+6057
02168+6052


IRAS 02157+6053 IR Spectrum
Fnu (Jy)
Hz
200
150
100
50
0
20000
40000
60000
80000

3 A 2MASS View of an IRAS Source

RA	DEC	2MASS	J	ϵ_J	H	ϵ_H	K	ϵ_K
34.936	61.102	02194455+6106074	16.705	0.158	15.668	0.155	15.259	0.164
34.927	61.121	02194253+6107157	17.366	0.25	15.467	0.105	14.953	0.134
34.920	61.118	02194085+6107054	17.213	0.208	16.01	0.209	15.628	0.219
34.919	61.110	02194066+6106358	16.852	0.156	15.925	0.165	15.366	0.183
34.932	61.102	02194373+6106079	16.491	0.135	15.808	0.159	15.391	0.178
34.988	61.120	02195703+6107109	16.683	0.154	15.771	0.149	15.124	0.137
34.990	61.067	02195755+6104024	16.972	0.189	15.851	0.158	15.204	0.149
34.968	61.123	02195232+6107233	16.235	0.094	14.91	0.062	14.165	0.068
34.990	61.120	02195770+6107105	14.803	0.052	13.985	0.046	13.646	0.045
34.992	61.121	02195805+6107164	15.251	0.042	13.92	0.054	13.348	0.046
34.968	61.117	02195236+6107025	17.111	0.199	16.244	0.225	15.425	0.192
34.984	61.119	02195618+6107081	17.365	0.574	15.492	0.26	15.095	0.254
34.980	61.124	02195520+6107267	15.433	0.06	14.672	0.079	14.373	0.091
34.990	61.099	02195769+6105570	13.638	0.027	12.864	0.027	12.514	0.018
34.974	61.110	02195368+6106374	16.663	0.141	15.591	0.119	14.881	0.107
34.982	61.117	02195564+6107025	13.509	0.027	12.891	0.031	12.777	0.032
34.979	61.101	02195493+6106042	16.868	0.177	15.39	0.113	15.007	0.131
34.954	61.111	02194887+6106412	16.019	0.083	15.145	0.089	15.092	0.129
34.947	61.118	02194726+6107063	17.408		15.24	0.095	14.655	0.116
34.977	61.113	02195441+6106462	16.151	0.082	14.832	0.069	14.303	0.075
34.996	61.081	02195893+6104519	12.318	0.027	11.884	0.027	11.783	0.024
34.944	61.112	02194663+6106429	15.65	0.062	13.981	0.045	13.27	0.026
34.989	61.096	02195743+6105438	17.261	0.215	16.304	0.231	15.595	0.207
34.983	61.093	02195595+6105337	16.888	0.163	15.608	0.131	14.793	0.112
34.995	61.105	02195878+6106168	15.805	0.071	14.863	0.064	14.744	0.101
34.959	61.100	02195005+6105582	16.711	0.141	15.932	0.162	15.423	0.181
34.954	61.082	02194901+6104540	14.541	0.038	13.809	0.04	13.633	0.047
34.951	61.080	02194813+6104489	14.953	0.043	14.131	0.042	13.698	0.051
34.948	61.096	02194747+6105442	16.432	0.124	15.26	0.104	14.8	0.119
34.946	61.093	02194713+6105334	16.391	0.113	15.205	0.087	14.53	0.075
34.973	61.084	02195344+6105030	16.817	0.142	15.895	0.165	15.091	0.138
34.945	61.081	02194685+6104504	17.107	0.227	16.004	0.173	15.013	0.114
34.944	61.088	02194667+6105171	15.26	0.05	14.481	0.062	14.287	0.067
34.942	61.084	02194611+6105007	15.417	0.048	14.677	0.054	14.387	0.076
34.939	61.084	02194525+6105014	15.494	0.062	14.073	0.057	13.637	0.057
34.988	61.080	02195712+6104496	15.237	0.059	13.856	0.046	13.355	0.056
34.966	61.076	02195187+6104324	17.134	0.194	15.855	0.139	15.584	0.225
34.978	61.094	02195463+6105375	16.548	0.131	15.811	0.144	15.341	0.18
34.979	61.085	02195504+6105057	17.045	0.177	15.462	0.102	14.766	0.104
34.985	61.098	02195635+6105516	15.747	0.084	14.934	0.084	14.403	0.094
34.996	61.118	02195907+6107030	15.909	0.072	14.379	0.049	13.655	0.047
34.979	61.089	02195506+6105211	17.109		15.601	0.138	14.01	0.067
34.986	61.081	02195658+6104516	16.928	0.178	15.611	0.14	15.06	0.161
34.980	61.107	02195513+6106258	17.66		16.27	0.209	15.059	0.123
34.982	61.097	02195575+6105491	16.279	0.116	15.609	0.125	15.01	0.14
34.979	61.123	02195497+6107219	17.139	0.222	15.25		15.183	0.15
34.929	61.146	02194287+6108471	16.687	0.168	15.442	0.134	15.285	0.178
34.936	61.128	02194474+6107397	16.84	0.163	15.661	0.126	15.274	0.166
34.929	61.127	02194289+6107365	16.459	0.134	15.805	0.153	15.398	
34.920	61.137	02194073+6108125	17.182	0.218	15.557	0.135	15.014	0.144
34.924	61.140	02194173+6108253	16.281	0.094	15.001	0.068	14.258	0.064
34.918	61.130	02194026+6107471	15.976		15.736	0.135	14.539	

4 Identifying YSOs using 2MASS Data