Identification of AGB stars at the GLIMPSE Survey

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Enrique Solano

Laboratorio de Astrofísica Espacial y Física Fundamental (LAEFF)

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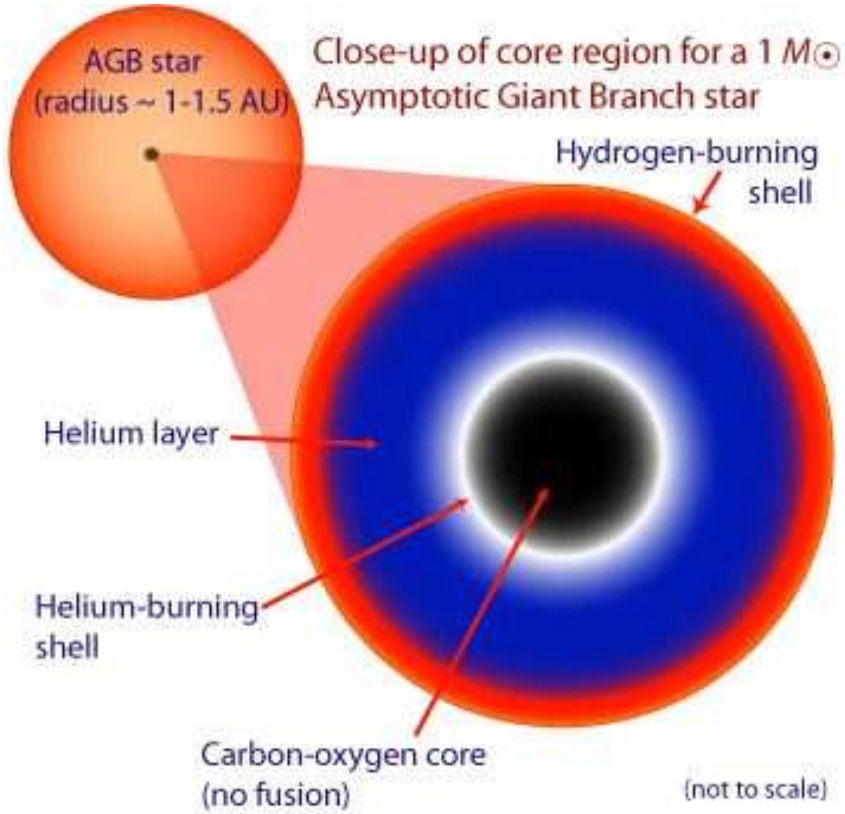
ESAC Trainee Project

Introduction
AGBs

- Structure.
- Variability.
- Mass loss.
- OH Maser & IR emission (OH/IR).
- Luminosity ($\simeq 10^3 - 2 \cdot 10^4 L_\odot$).
- Previous IR studies: IRAS.



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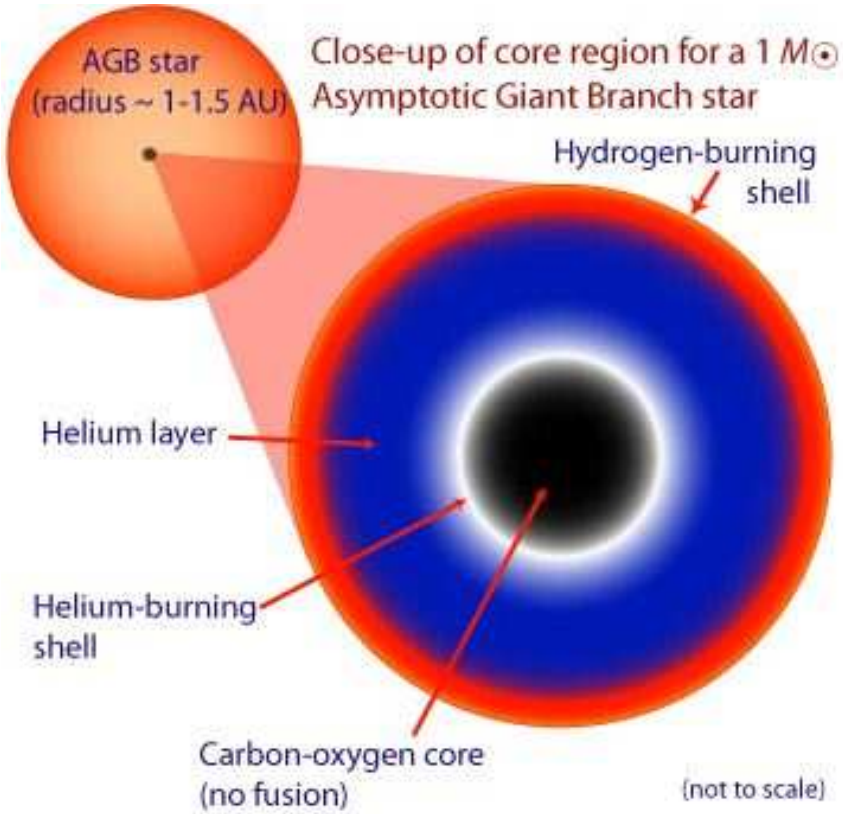

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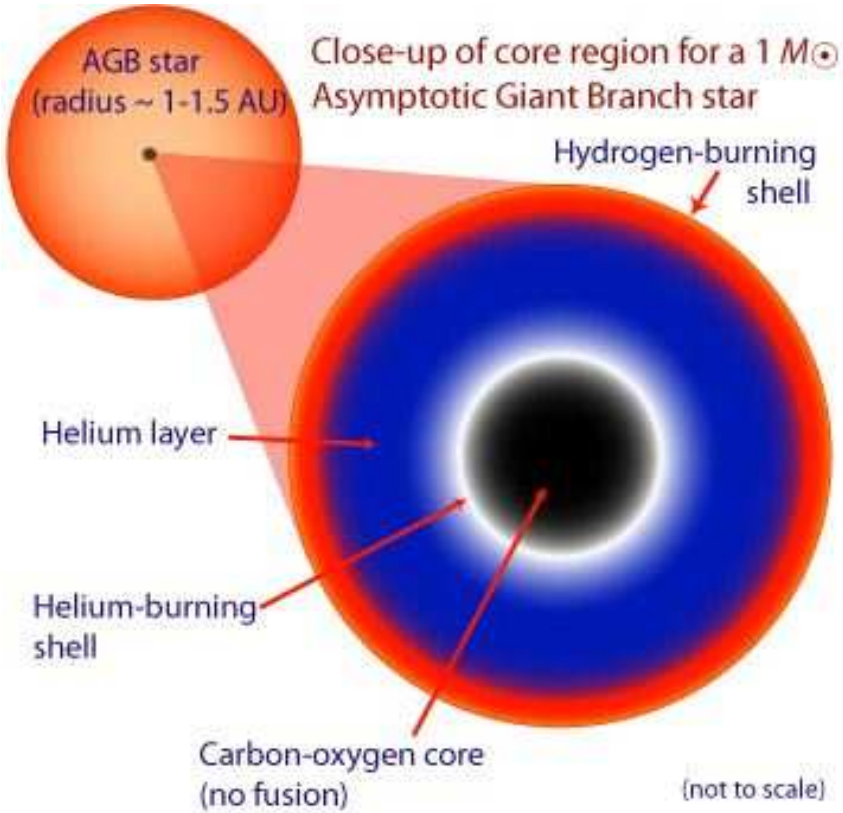

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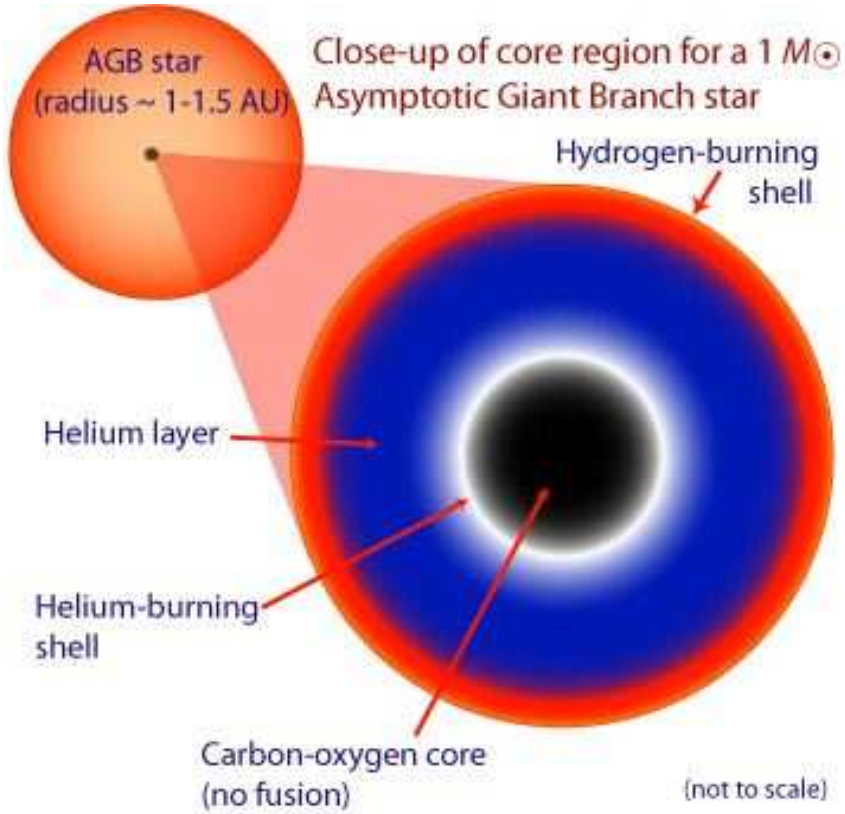

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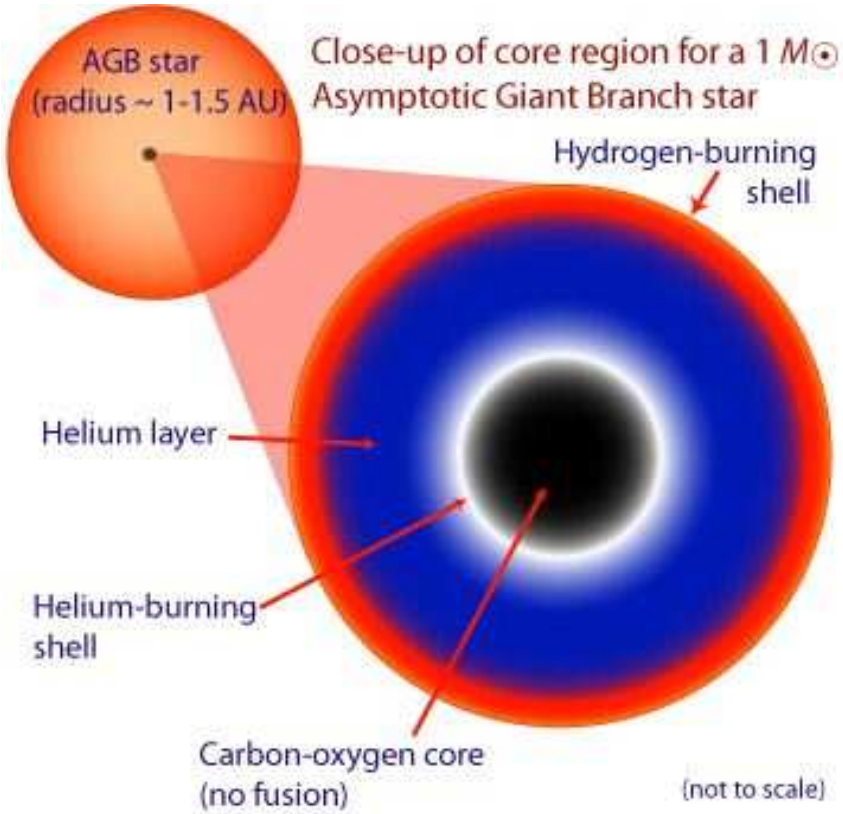

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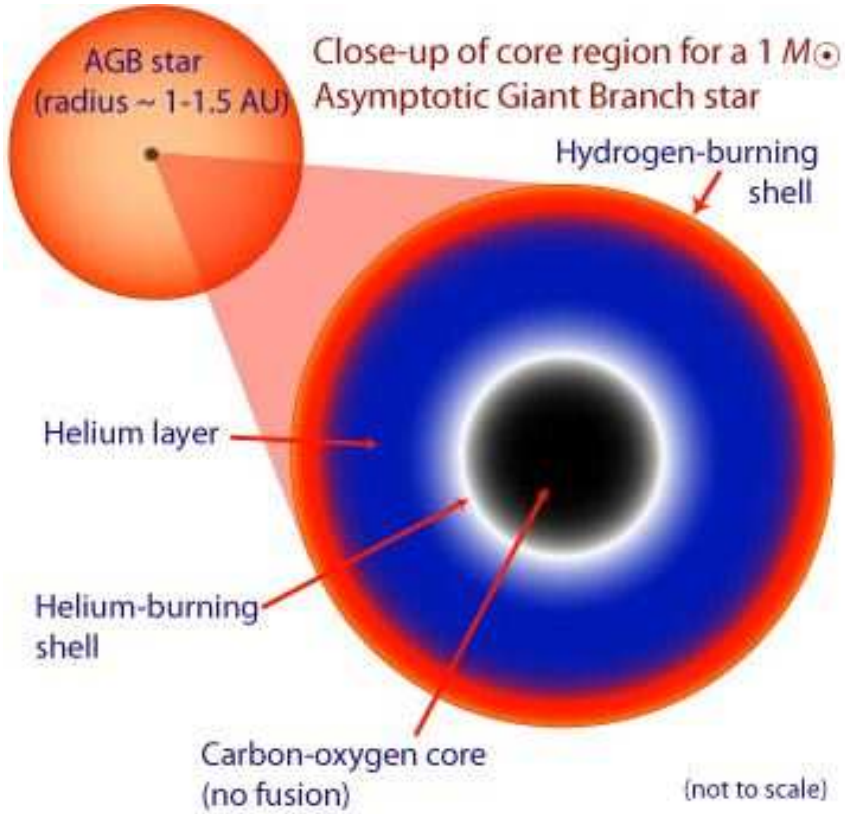

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  - GLIMPSE I:
    $|l| \in (10°, 65°)$ $|b| < 1°$
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- Develop photometric criteria for AGBs detection.
- Identify GLIMPSE counterpart of an OH/IR sample (766 objects observed with VLA - Sevenster et al. 2002).
  - Try to reproduce identifications made by Dieter Engels (288 possible id.).
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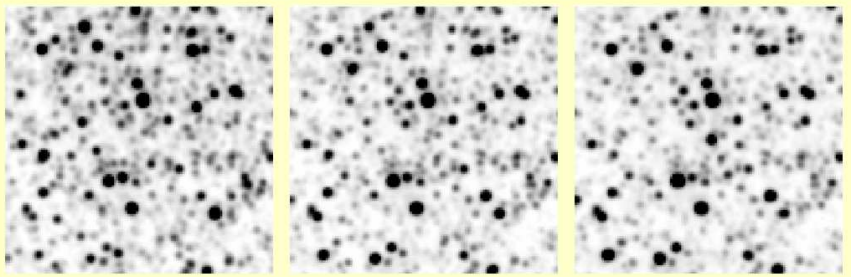
OH 011.900-00.041

Coordinates (2000)

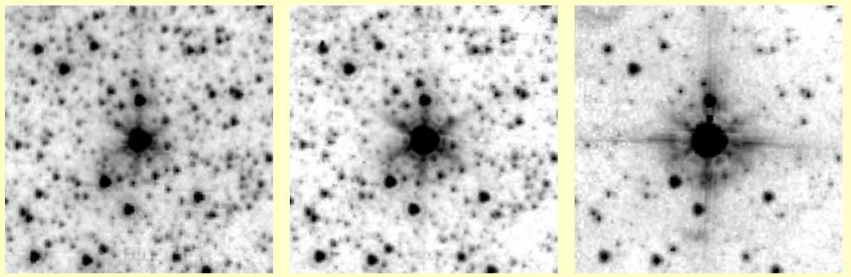
18 11 48.855 -18 38 48.23 Sevenster et al. (2002) (Error < 1")

IRAS 18088-1839 (Radio - IRAS) Δ= 2" MSX6C G011.9006-00.0418 (Radio - MSX) Δ= 2"

2MASS 18114884-1838484 (MSX - 2MASS) Δ= 0" GLMA G011.9002-00.0415 (MSX - GLIMPSE) Δ= 0"



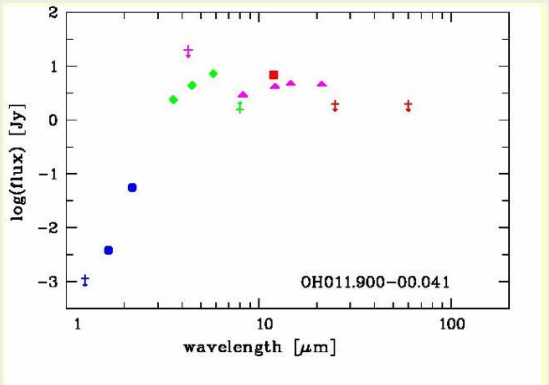
2MASS J-Image | 2MASS H-Image | 2MASS K-Image



GLIMPSE [3.6]-Image | GLIMPSE [4.5]-Image | GLIMPSE [5.8]-Image

Infrared flux densities in Jy (logarithmic units)

2MASS			GLIMPSE	MSX	GLIMPSE			MSX	IRAS		MSX		IRAS	
J	H	K	3.6	4.35	4.5	5.8	8.0	8.28	12	12.13	14.65	21.3	25	60
						[μm]								
<-2.942	-2.414	-1.256	0.376	<1.301	0.643	0.860	>0.200	0.477	<0.301	0.633	0.690	0.672	<0.301	<0.301



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- Proximity criteria: 83.4%.
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- Discard candidates with field-stars properties.
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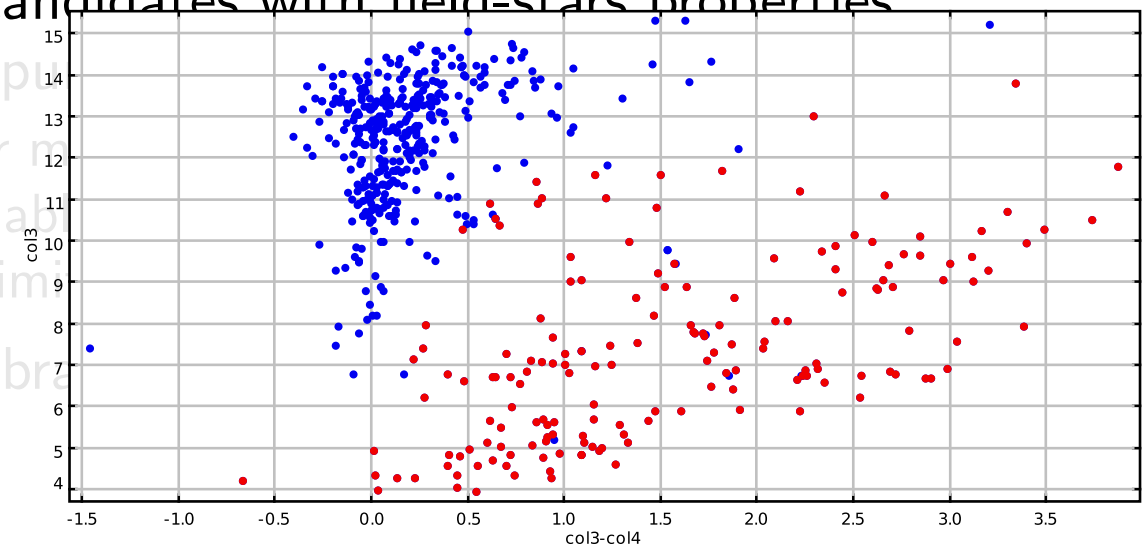

Figure: [3.6]-[4.5] VS [3.6]

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- Visual check of Sevenster ids.
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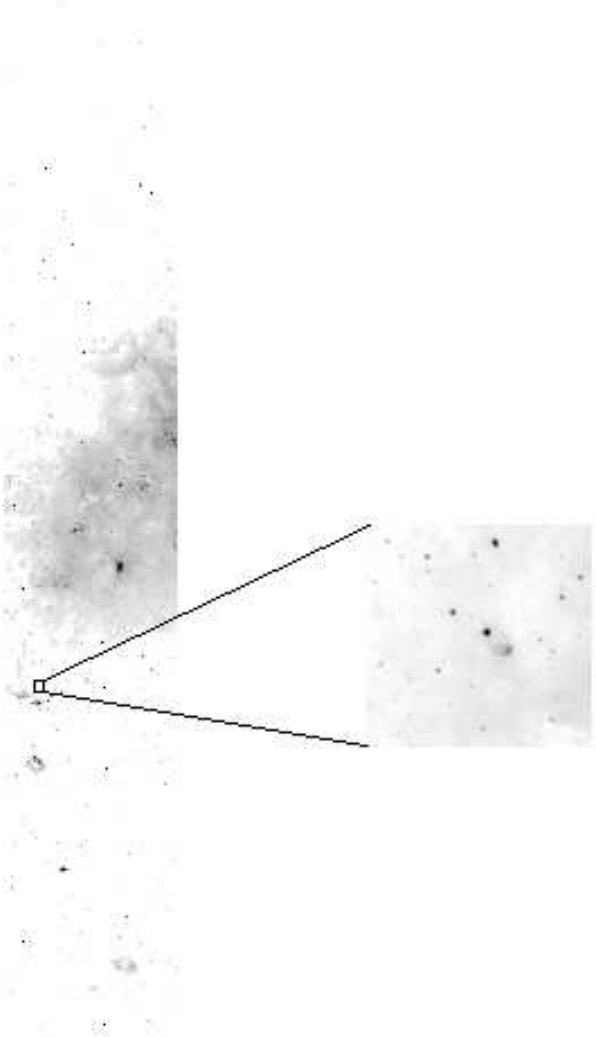

LEOPARD

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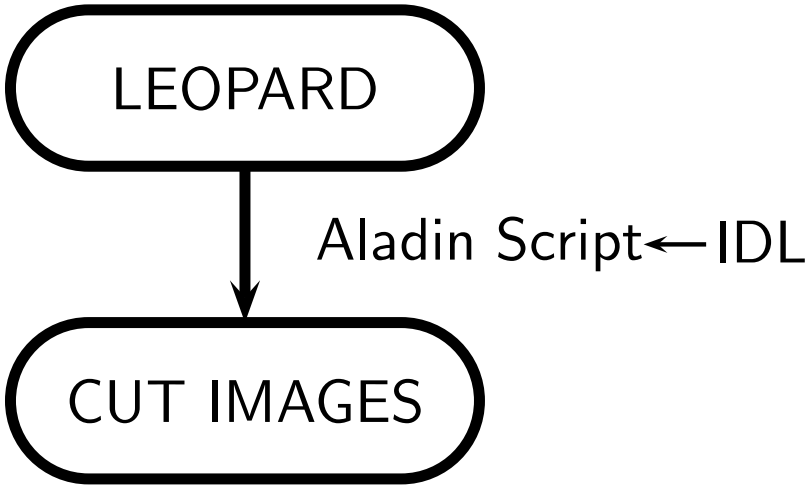

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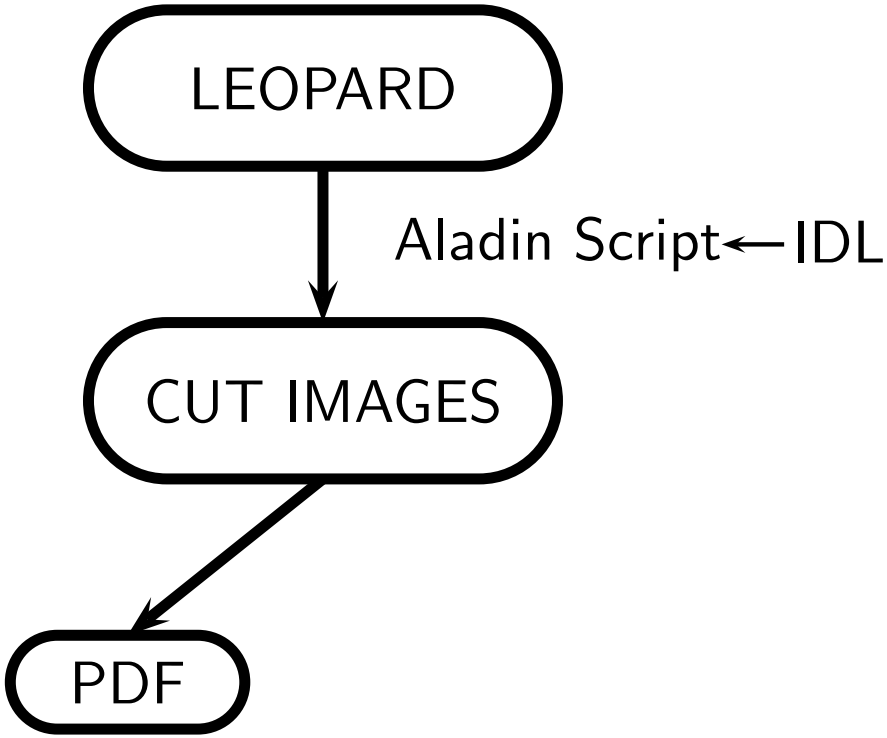

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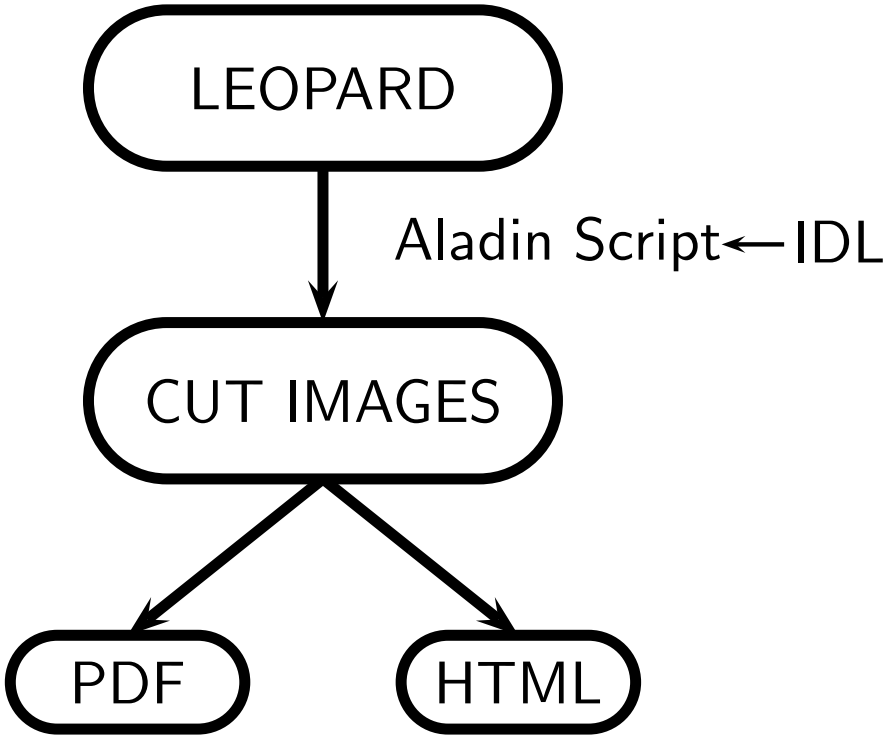

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Implementation

- IDL Script $\longrightarrow$ HTML Code.
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OH Source

OH000.000+00.352
OH000.024-00.874
OH000.071-00.205
OH000.072-02.044
OH000.190+00.036
OH000.207+01.414
OH000.260+01.027
OH000.313+01.674
OH000.319-00.041
OH000.333-00.181
OH000.344+01.567
OH000.453-01.216
OH000.484-00.167
OH000.517+00.050
OH000.523-00.667
OH000.580+02.009
OH000.621-00.661
OH000.647+01.889
OH000.667-00.035
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OH000.892+01.342
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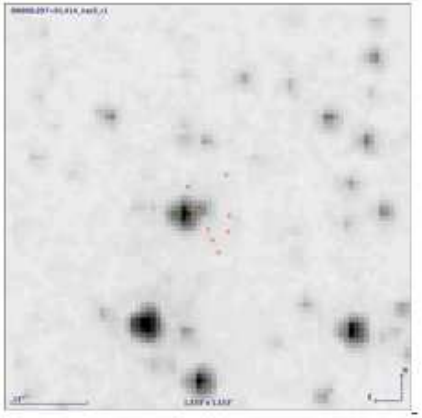
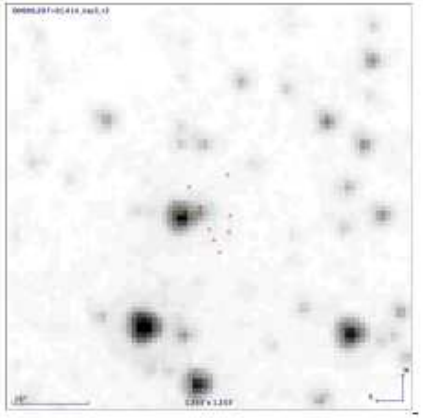


irac3



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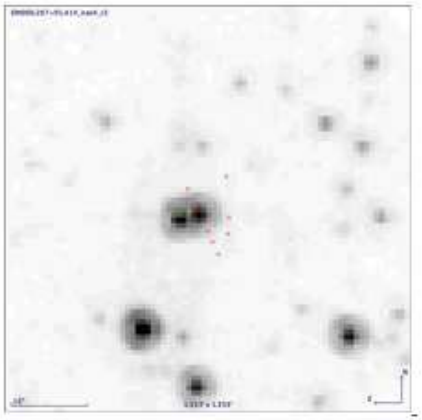
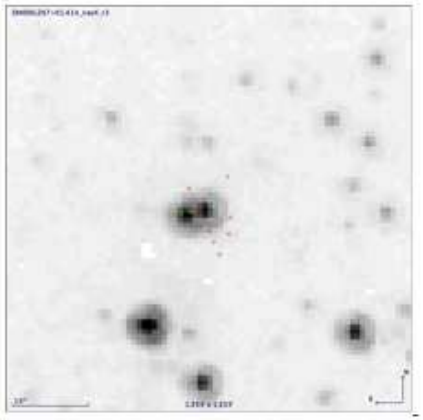


irac4



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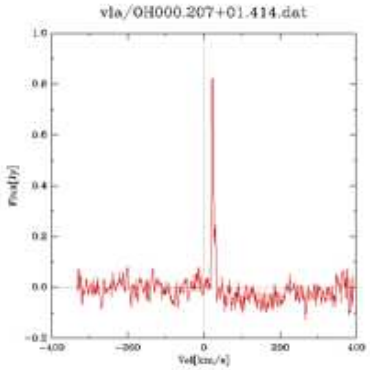

Sevenster Spectrum

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- Correct id: 403.
- Wrong id: 20.
- Unidentified: 333 (no GLIMPSE images, no info...).
- Other cases: 10.

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IRAS 16339-4717

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Properties

- Possible interaction with HII region.
- References:
  - Caswell & Haynes 1975: Catalogued as OH/IR.
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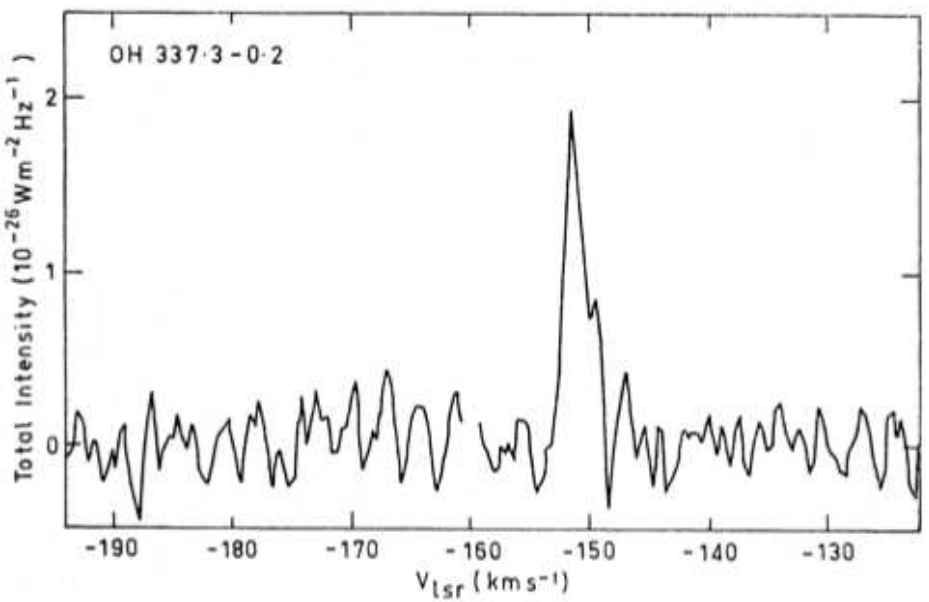

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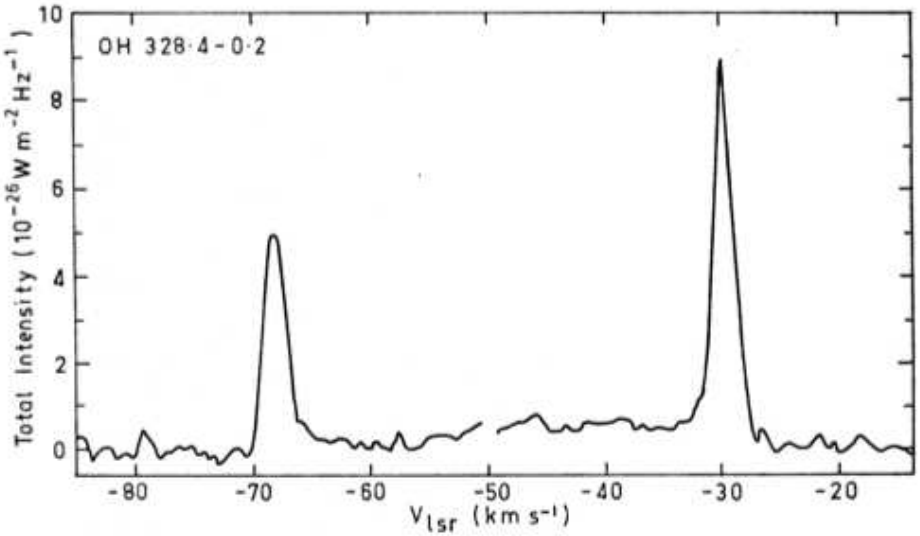

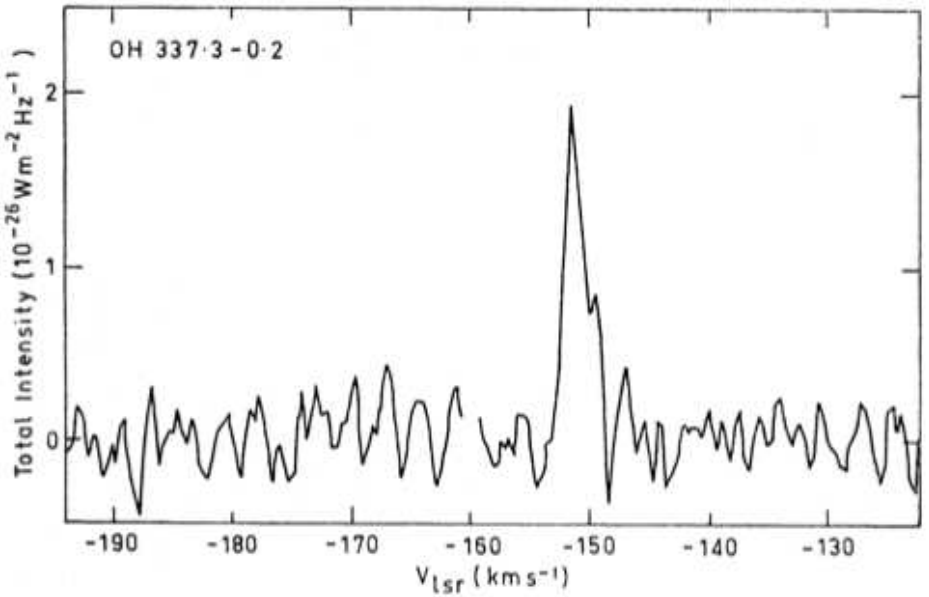

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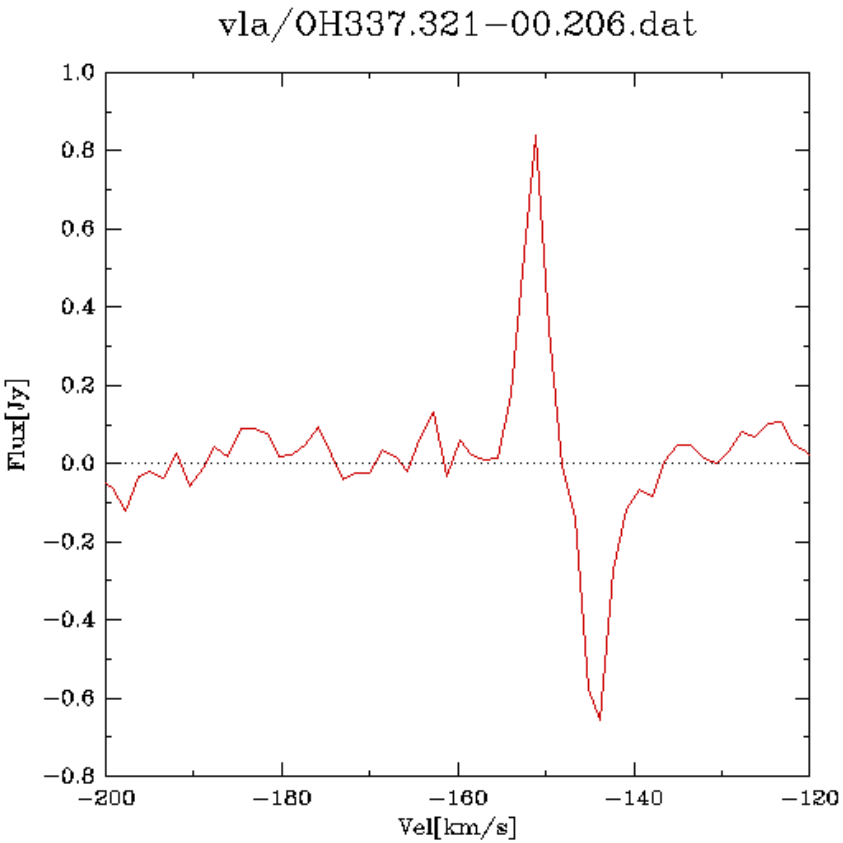

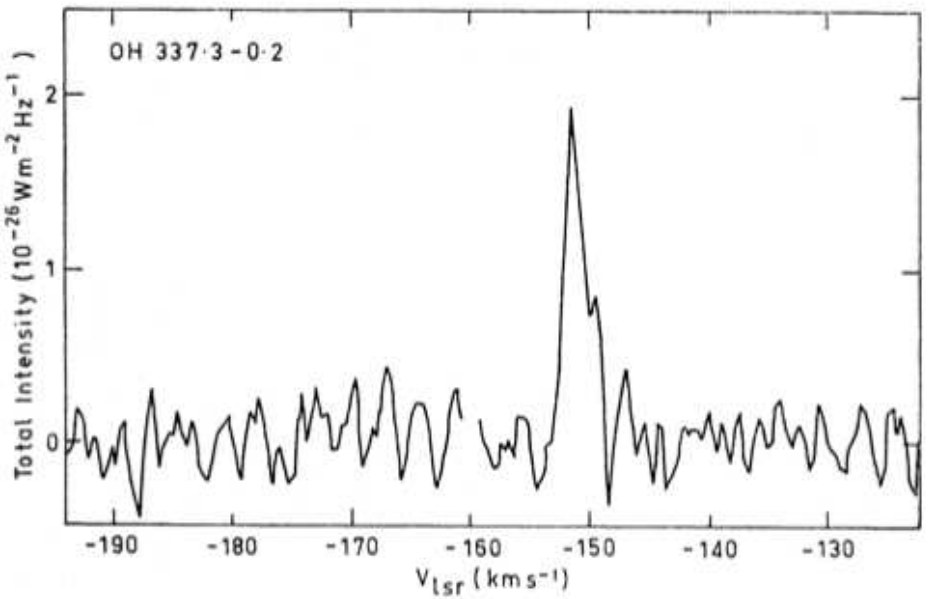

IRAS 16339-4717
SED

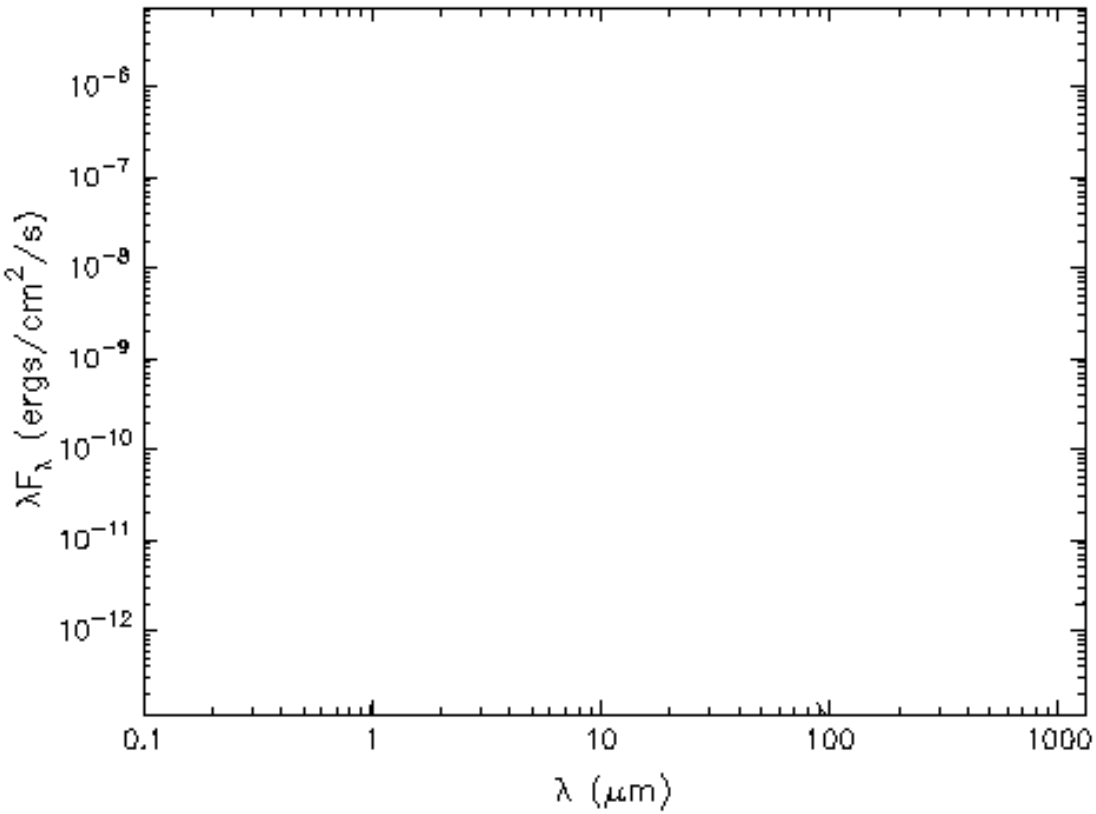

Figure: Online SED Fitter - Robitaille

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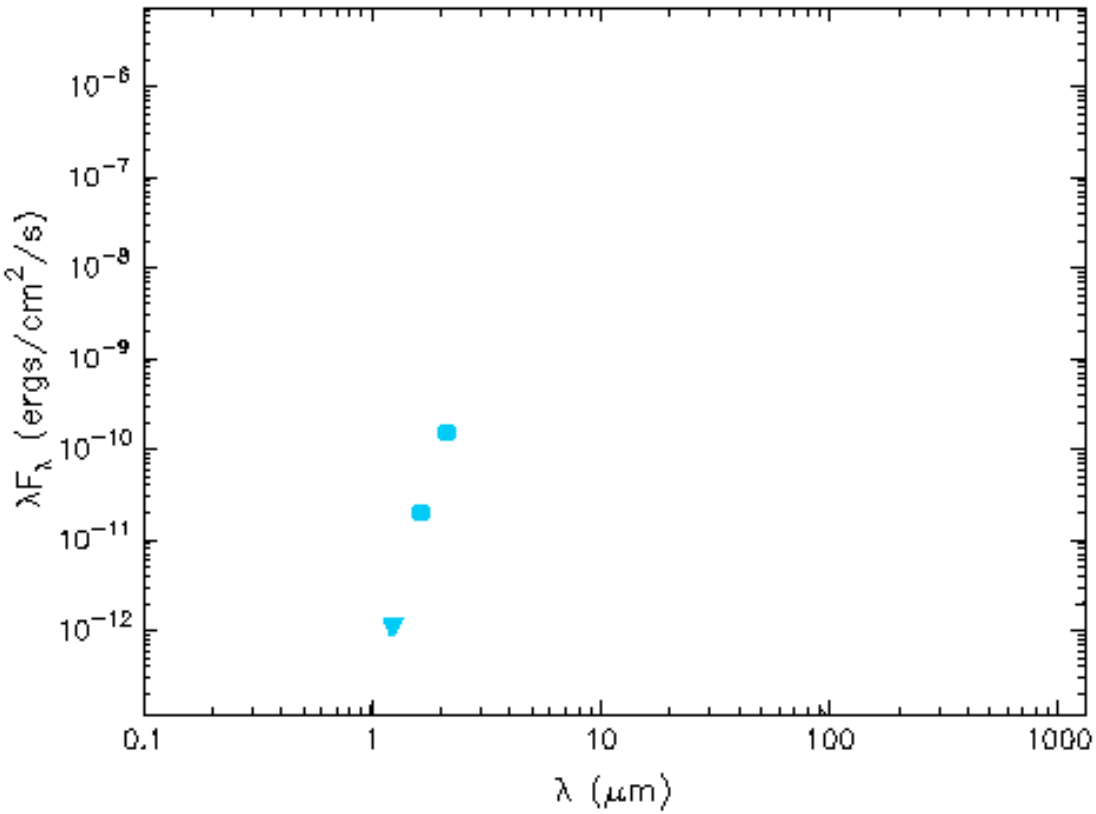

2MASS

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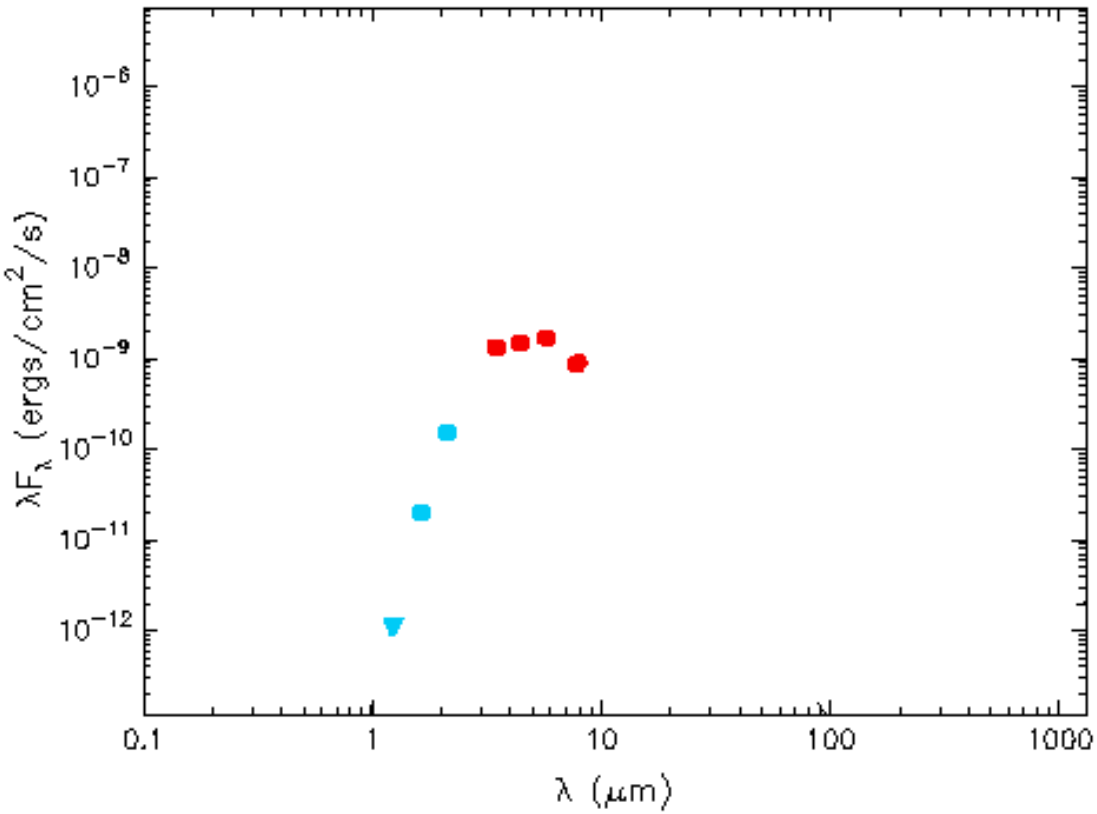

2MASS
IRAC

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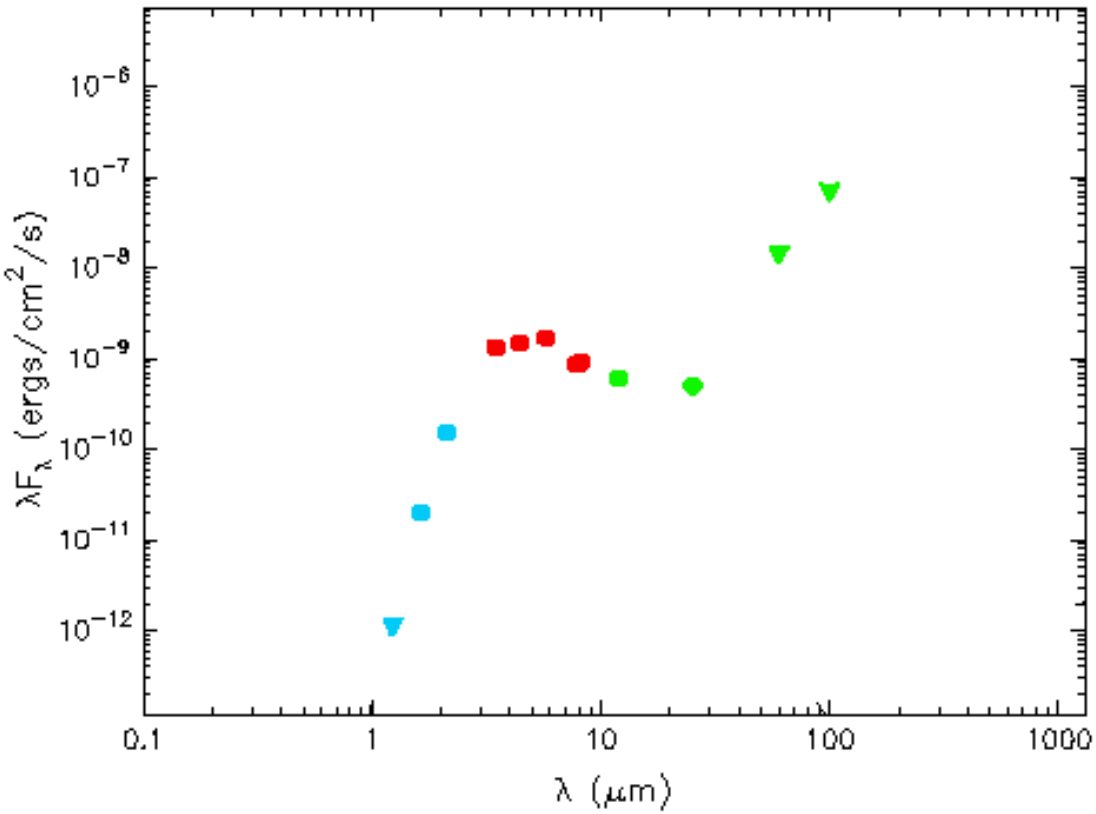

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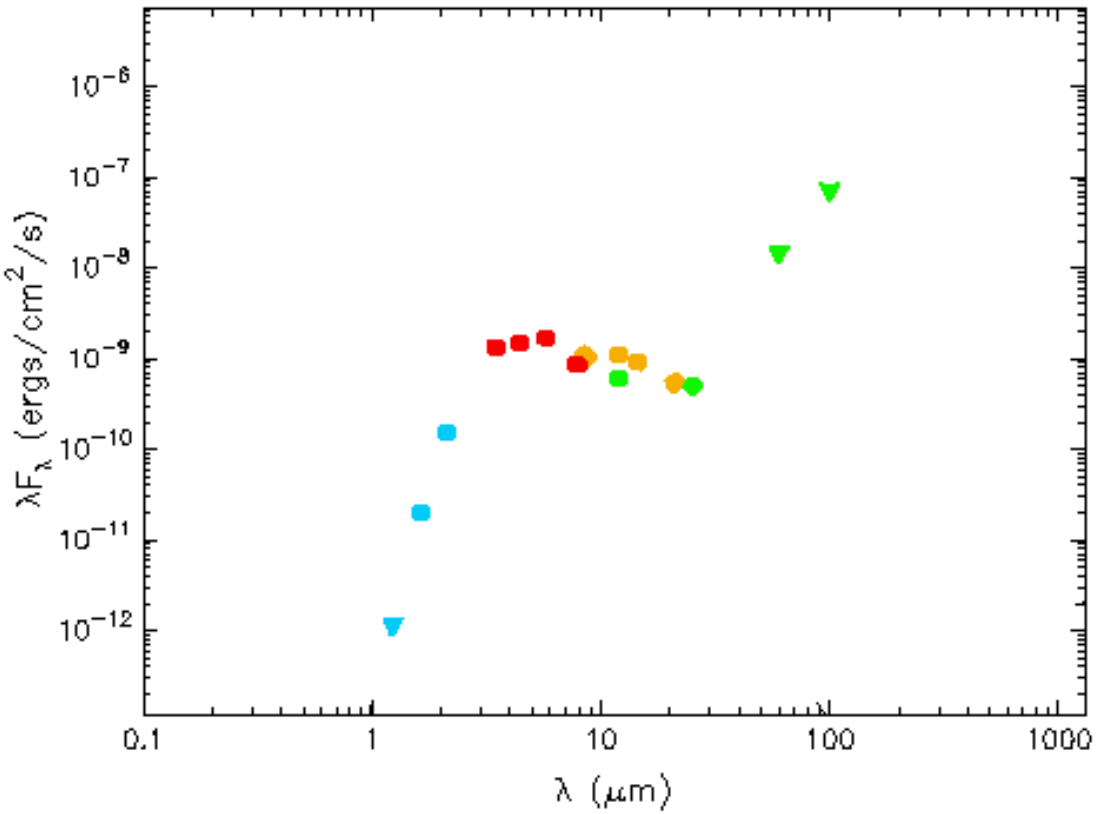

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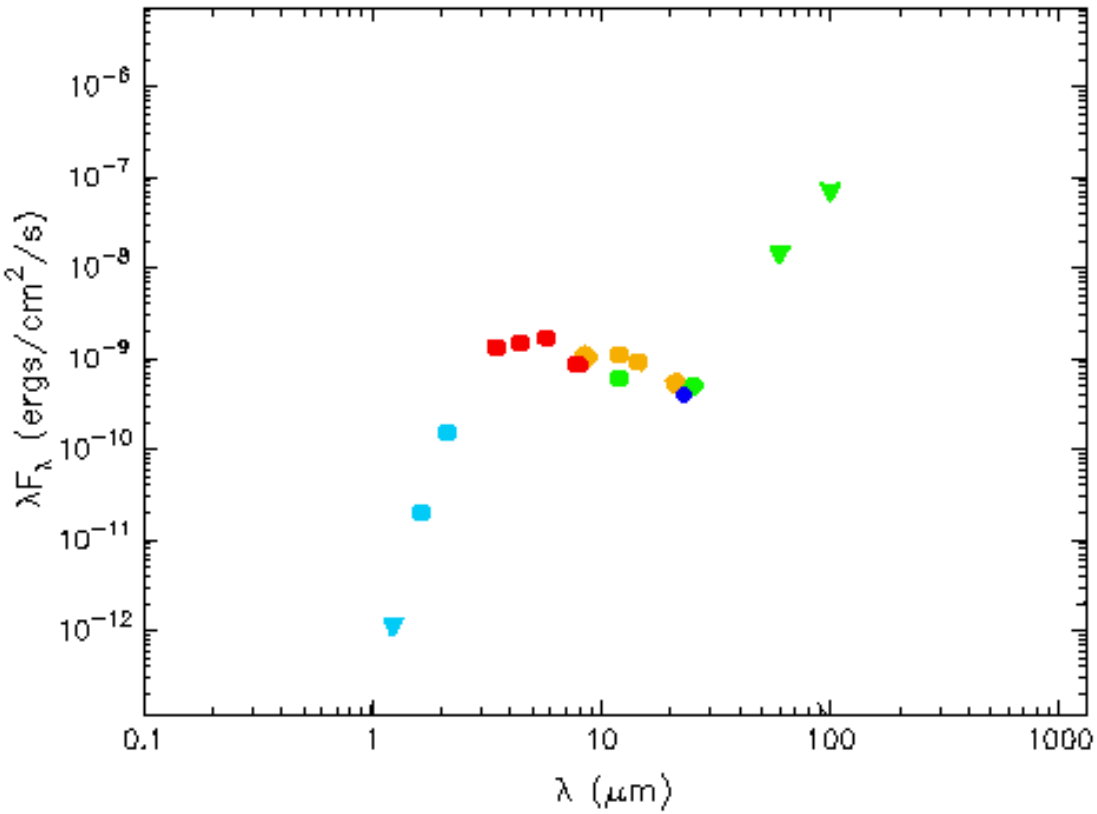

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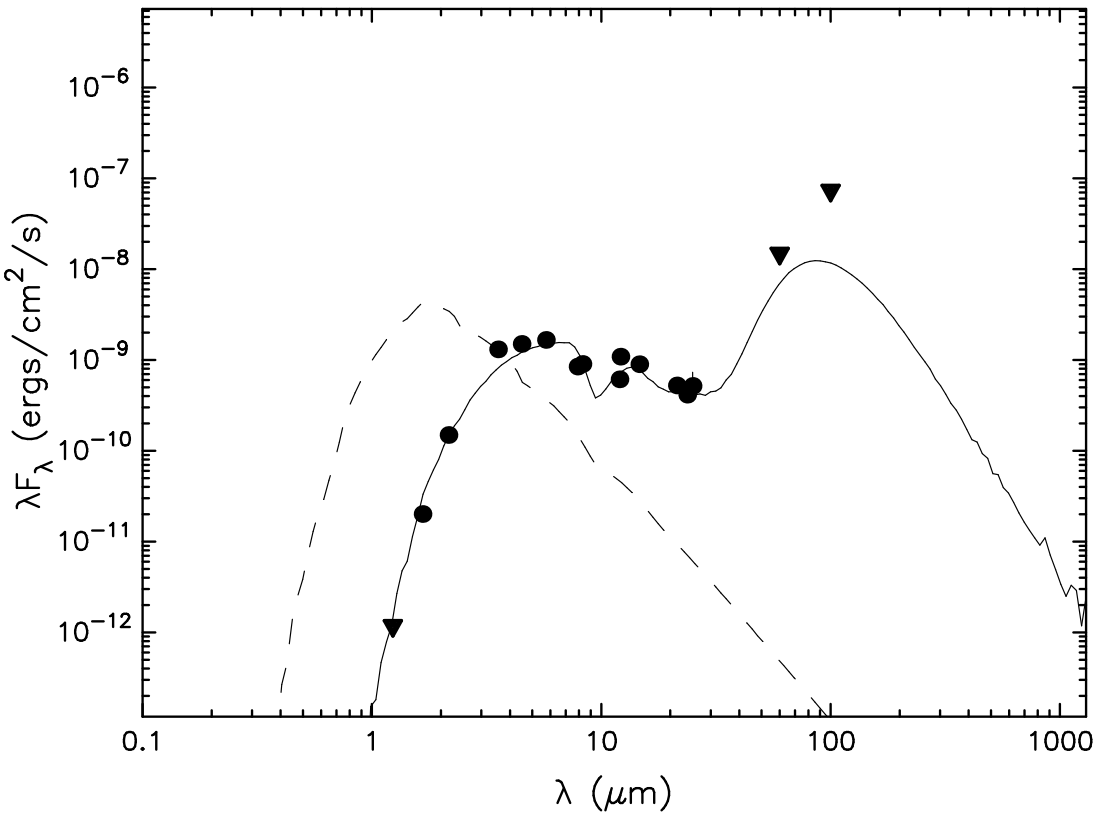

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Observing proposal

- Nature:
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  - ISAAC:
    - J, H, Ks imaging → proper motion.
    - K-band spectrum → nature of central object & caracterize nebulosity.
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Conclusiones
To Do

- Deep study of colours to improve method.
- Most complete IR SED ← Power of VO.
- Extension to other OH surveys.
- Launch to all GLIMPSE.

Conclusions
Tools

- Aladin
- TOPCAT
- Mopex/Apex
- YSO SED Fitter
- Emacs
- IDL
- Leopard
- GATOR
- LaTeX

- Data mining
- Observing proposals