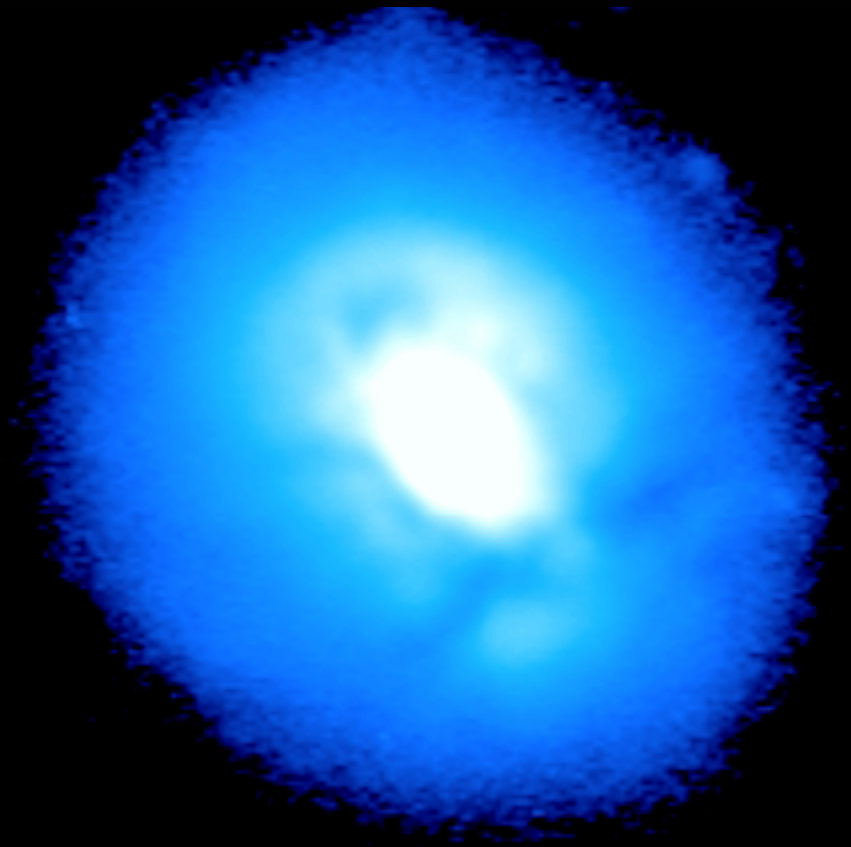
3D Spectroscopy of Blue Compact Dwarf Galaxies (BCDs)

Estallidos IV



Ismael Martínez-Delgado (IAC)

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Alexei Moiseev (SAO)

Luz Marina Cairós (IAC)

Madrid, 26 de Enero de 2006

Main Characteristics of BCDs

- Low luminosity ($M_B \geq -18$)
- Compact starburst ($D \leq 1$kpc)
- Spectra typical of HII regions
- Gas rich galaxies HI ~10^8-10^9 M_o (Thuan & Martin 1981)
- Metal poor systems ($1/50 \leq Z/Z_o \leq 1/3$)
- High Star Formation Rate ~ 0.1-10 M_o yr-1 (Fanelli et al 1988)

Supersonic Line Broadening of Ionized Gas

$\sigma \geq c_{HII} = 10 \text{ km s}^{-1}$

- Giant HII Regions (GHIIRs)
  - Smith & Weedman 1972
  - Melnick 1977
  - Chu & Kennicutts 1994
  - Muñoz-Tuñón et al 1996
- HII Galaxies
  - Melnick et al 1988
  - Telles & Terlevich 1993
  - Telles et al 2001

Supersonic Line Broadening of Ionized Gas

$\sigma \geq c_{HII} = 10 \text{ km s}^{-1}$

Responsible Mechanism?

- Gravitation
  - **Terlevich & Melnick 1981** Virialized Self-Autogravitating system
  - **Tenorio-Tagle et al 1993** Cometary Stirring Model
- Mechanical Energy of Stellar Winds
  - **Dyson 1979** Unresolved stellar winds and shells
  - **Chu & kennicutt 1994**

3D Spectroscopy of Blue Compact Dwarf Galaxies (BCDs)

Observations at the **S**pecial **A**strophysical **O**bservatory (SAO) :

Big **T**elescope **A**lta-azimuthal (BTA) : D=6m

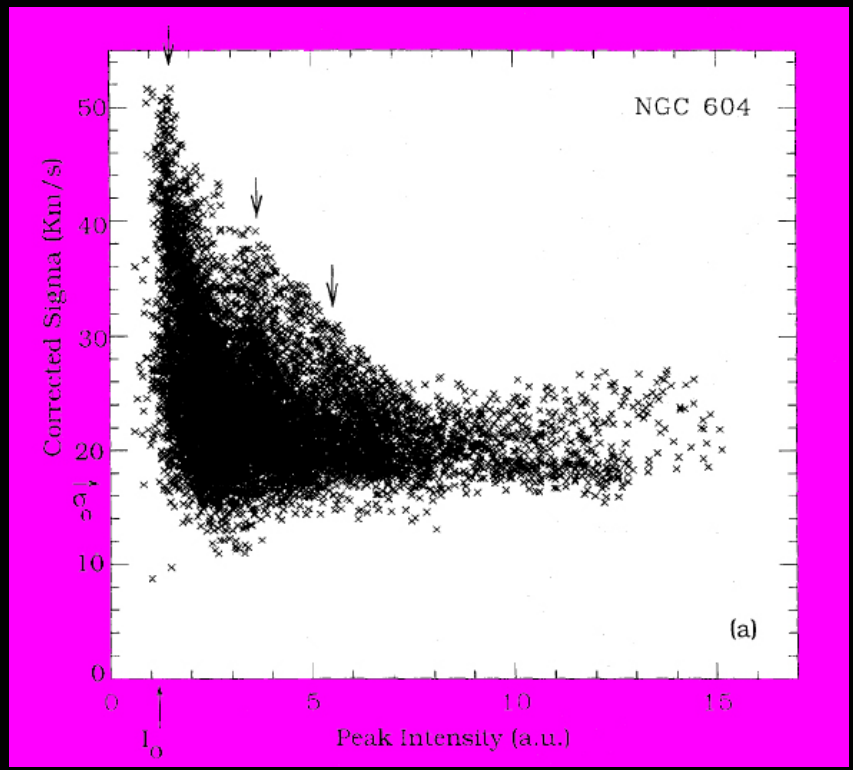
SCORPIO:

Spectral Resolution:	$\delta\lambda$= 0.7 Å
Spectral Range:	$\Delta\lambda$= 13 Å
Spatial resolution:	μ= 0.7"/pixel
Seeing	~ 2.0"

What we are looking for?

- Inonized gas signature's such as:
  - Shells
  - Superbubbles
  - Supergalactic winds





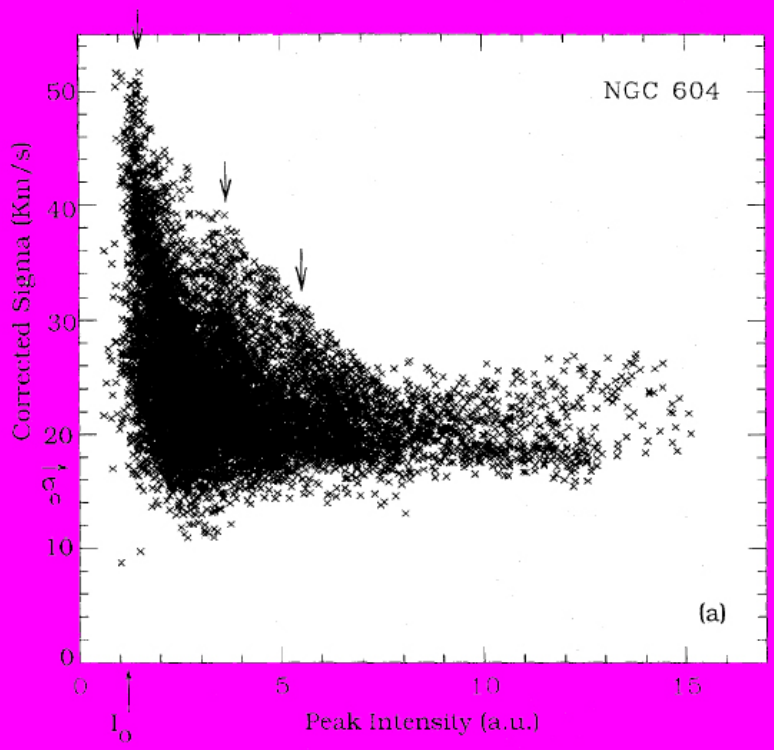
What we are looking for?

- Inonized gas signature's such as:
  - Shells
  - Superbubbles
  - Supergalactic winds

Kinematic core: all points that preserve the line profile. In diagrams appear as Horizontal Bands.

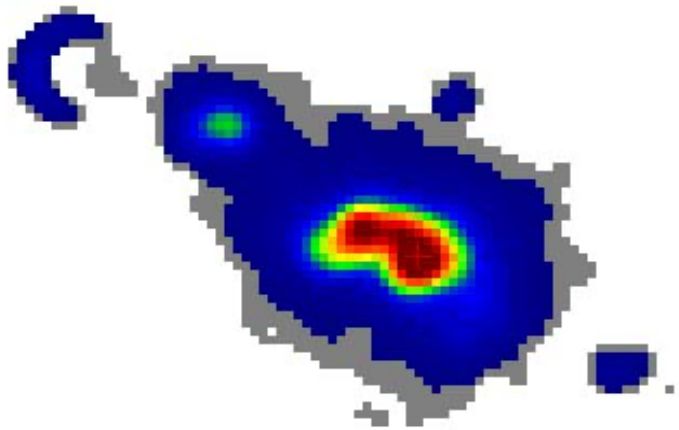
Expanding Shells: low intesity regions that appear as Inclined Bands.

Muñoz-Tuñón et al 1996

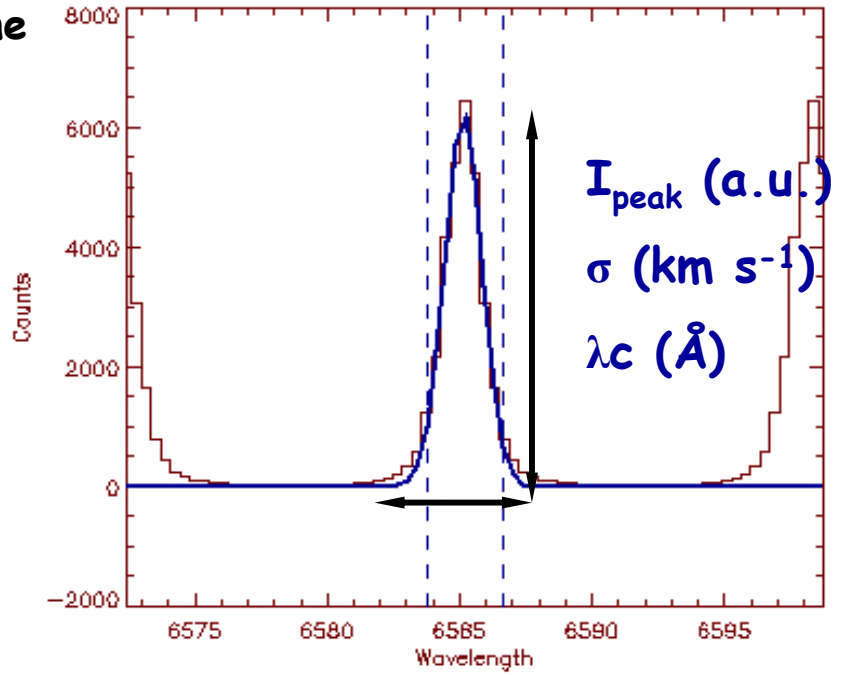


Steps

Single gaussian fit to the emission line profile

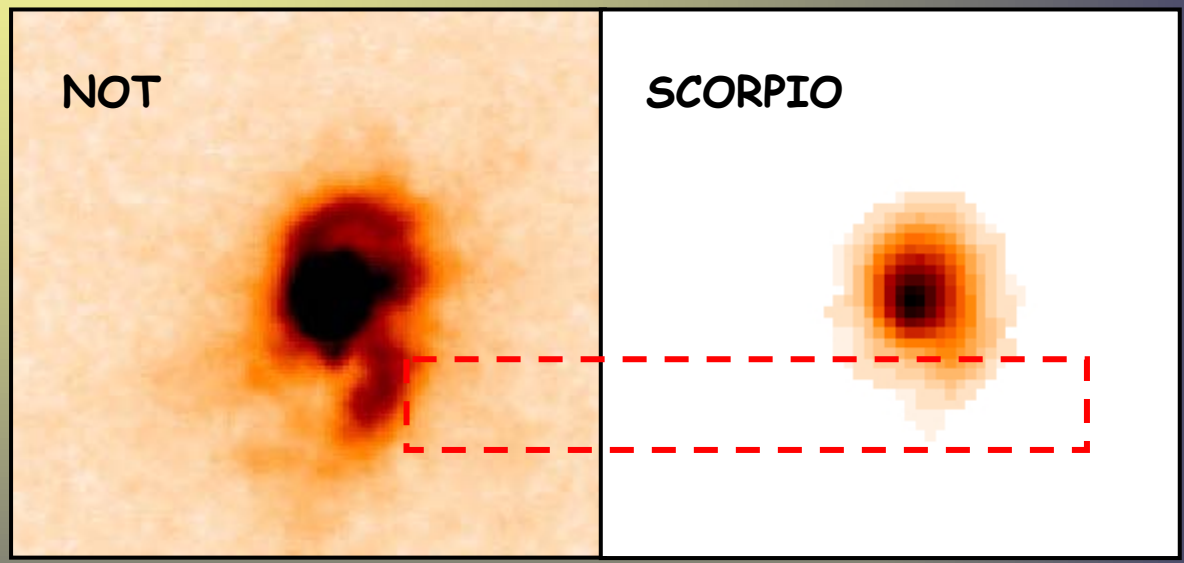


Mrk600

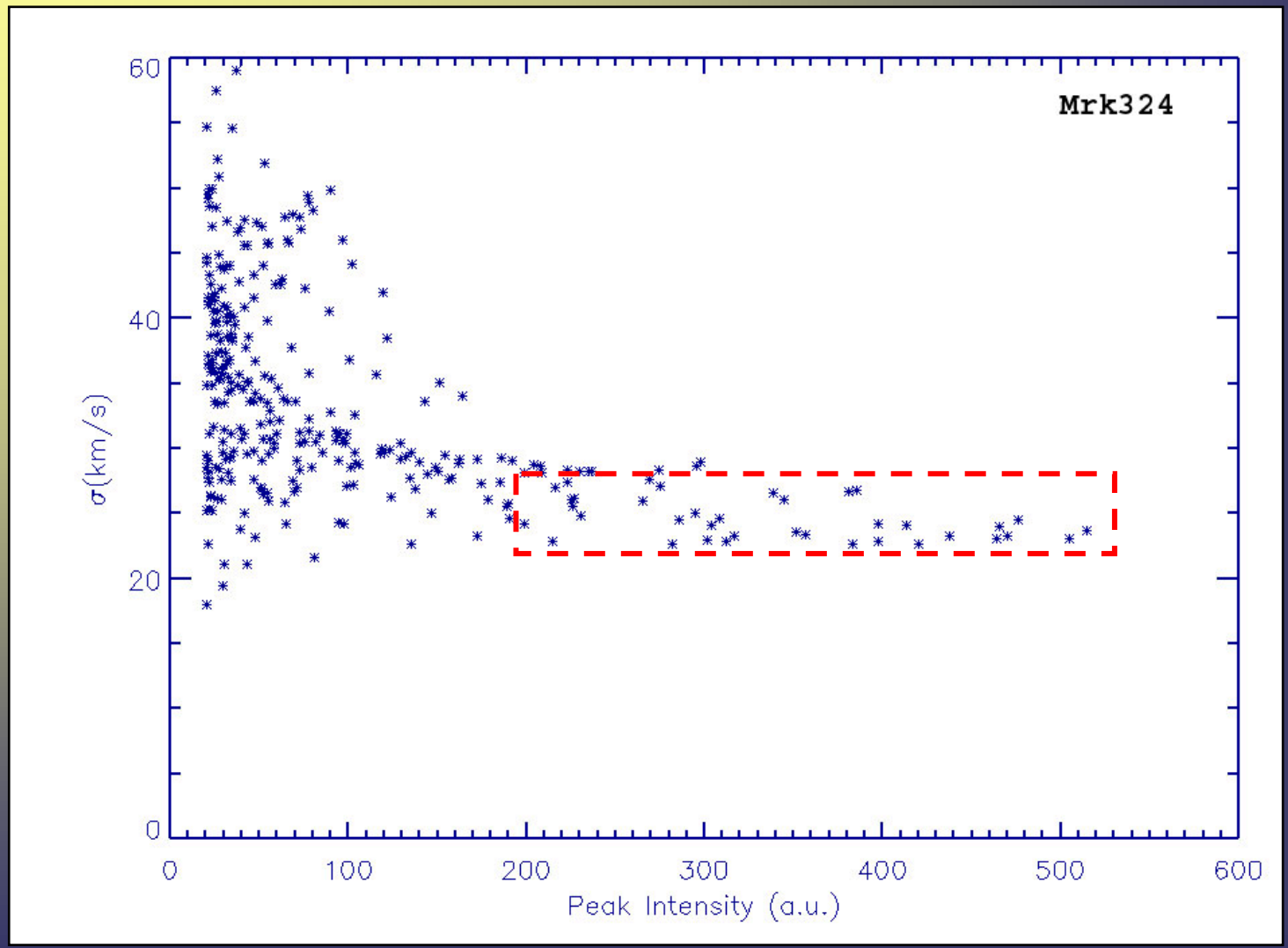


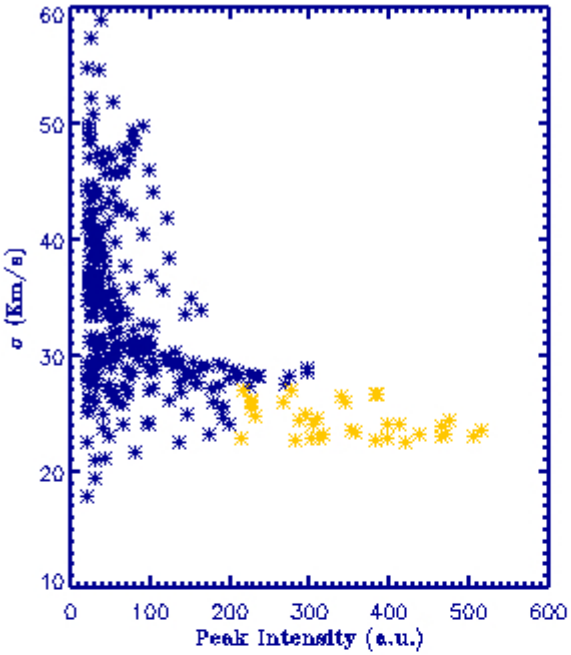
- **Parameters of interest:**
  - Intensity at the peak, I_{peak}
  - Central lambda, λc
  - Velocity dispersion, σ

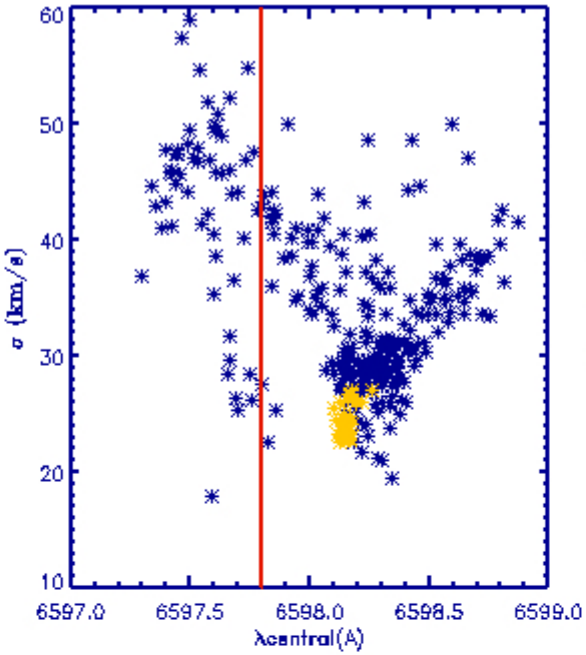
3D Spectroscopy of Blue Compact Dwarf Galaxies (BCDs)

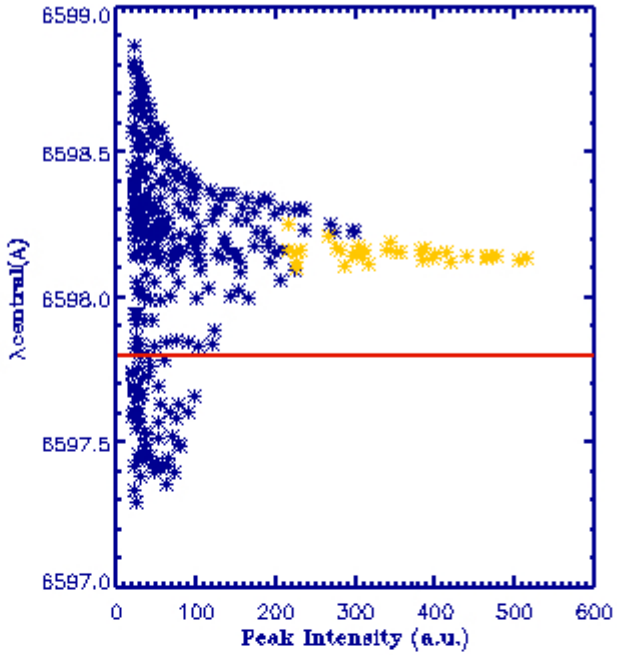


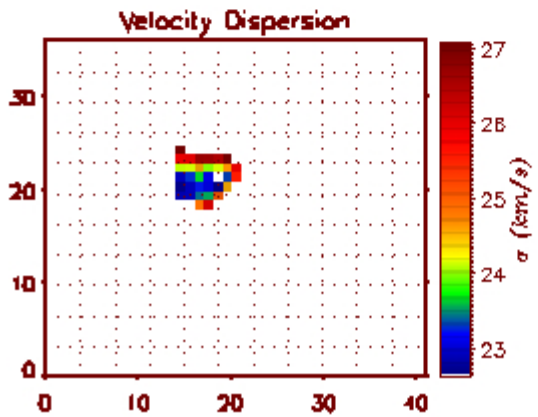
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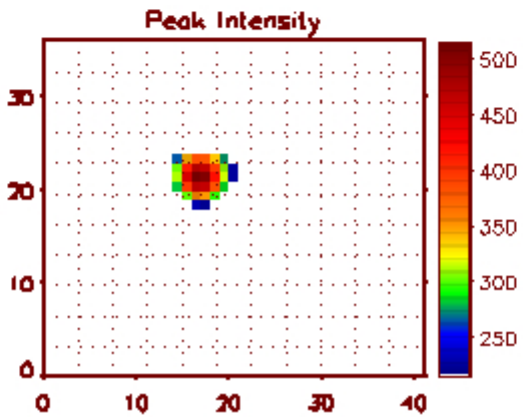


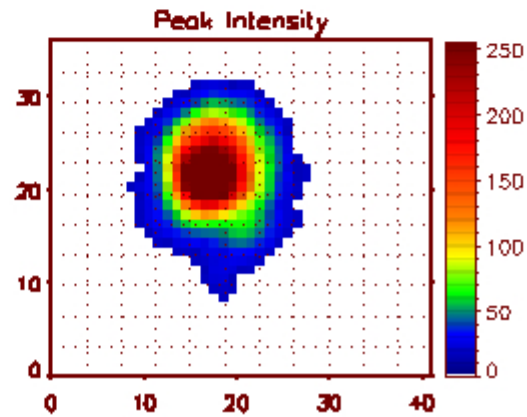

σ (Km/s)
Peak Intensity (a.u.)


σ (km/s)
λcentral(A)

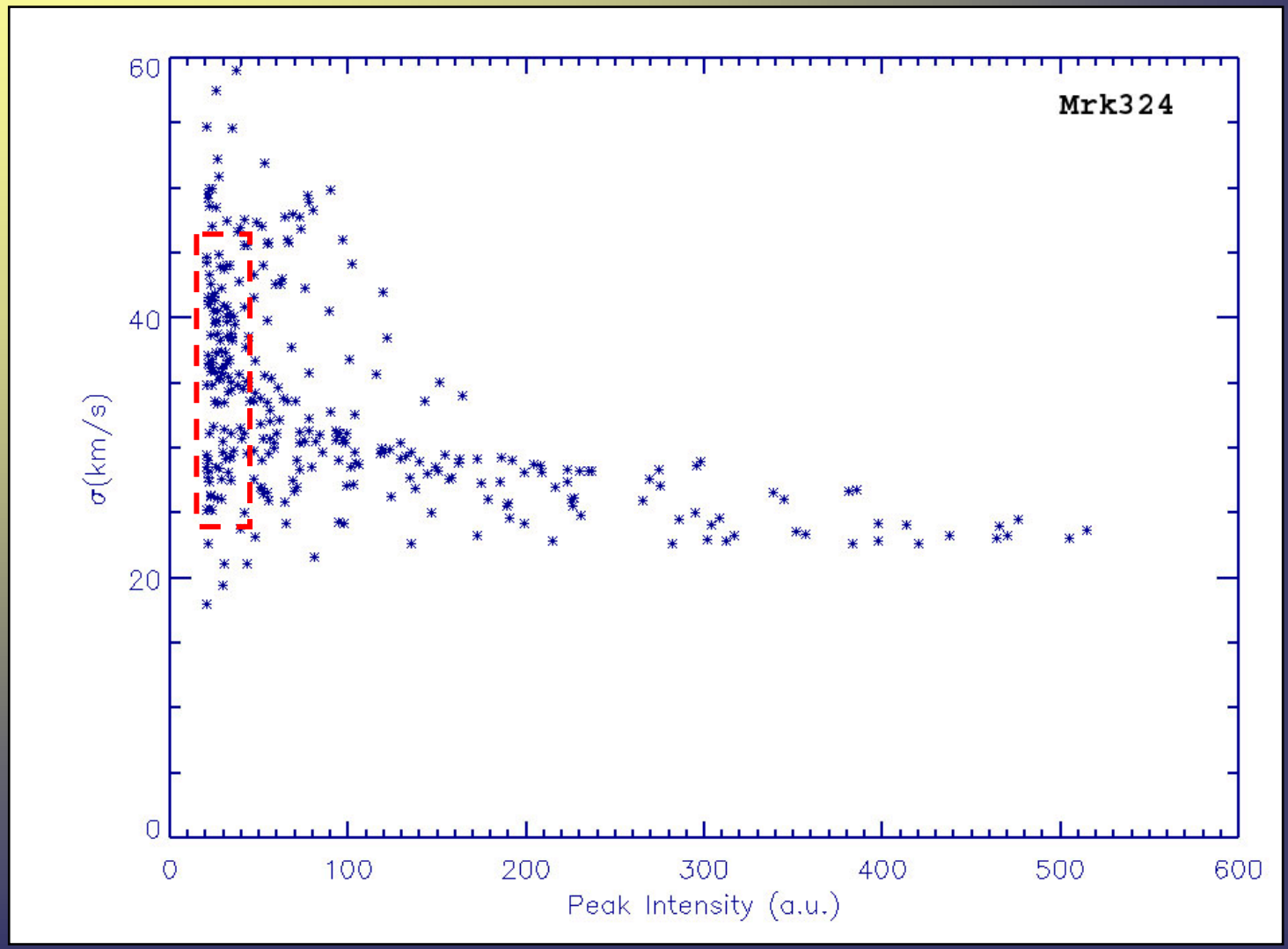

λcentral(A)
Peak Intensity (a.u.)

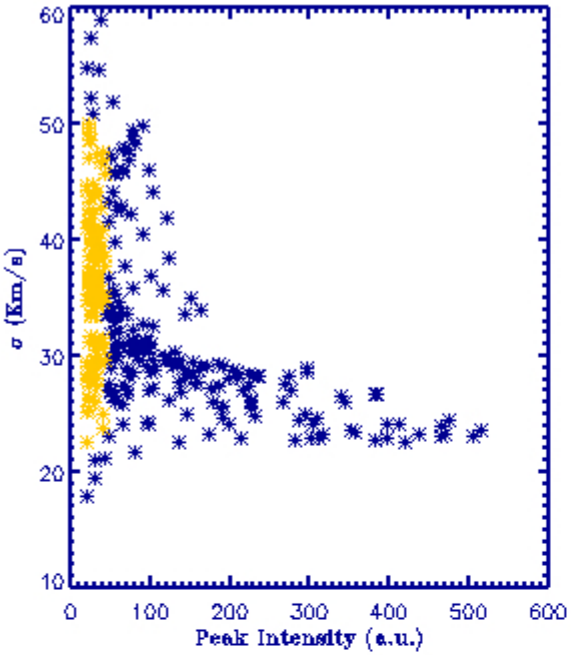

Velocity Dispersion
σ (km/s)

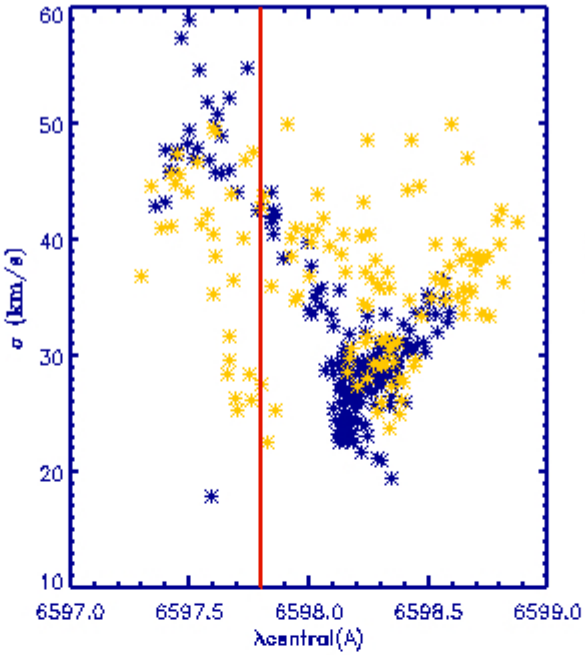

Peak Intensity

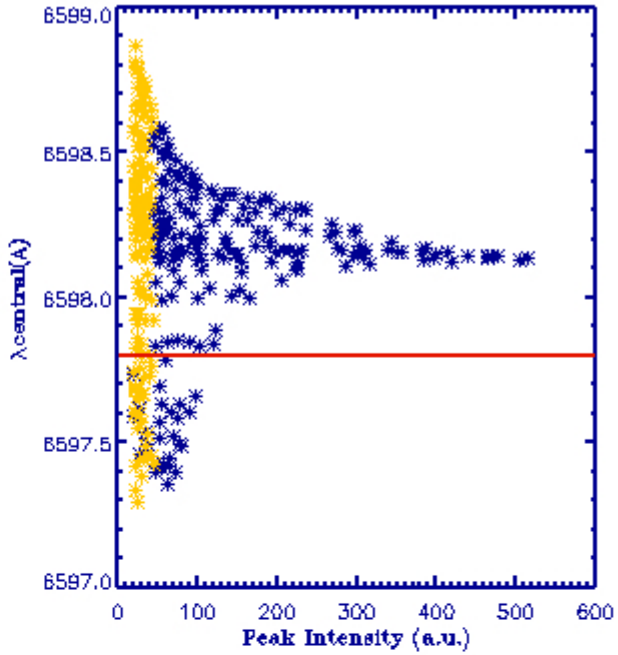

Peak Intensity

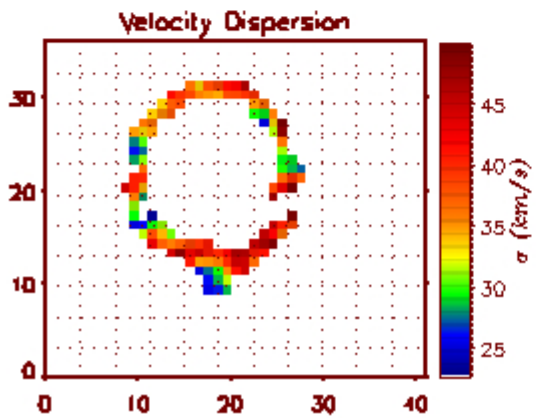
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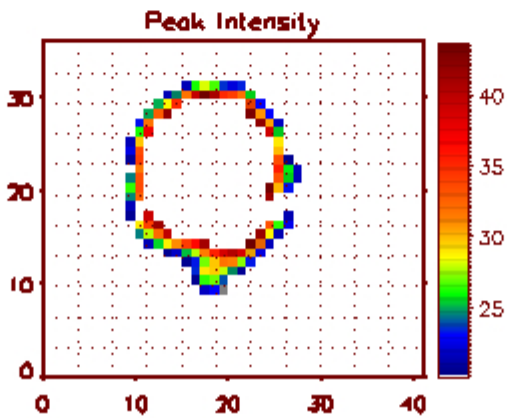


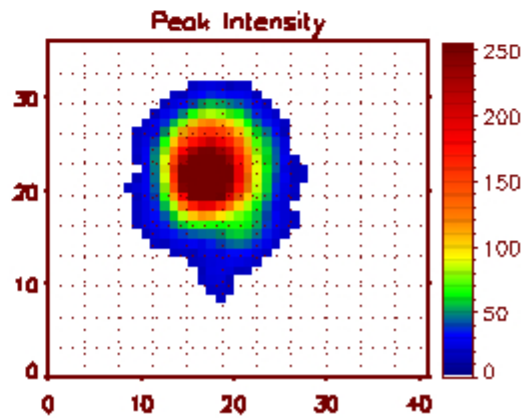

σ (Km/s)
Peak Intensity (a.u.)


σ (km/s)
λcentral(A)

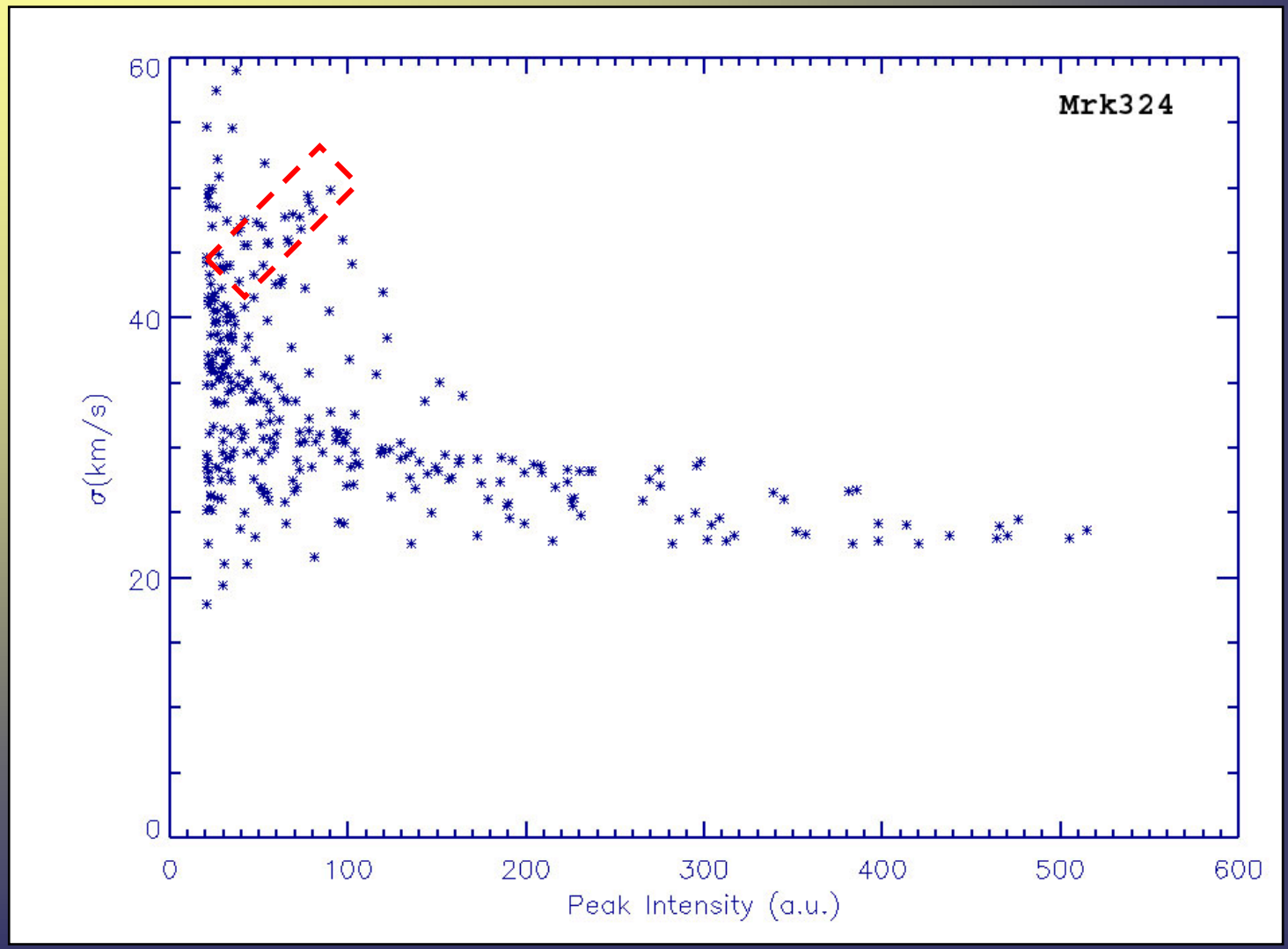

λcentral(A)
Peak Intensity (a.u.)

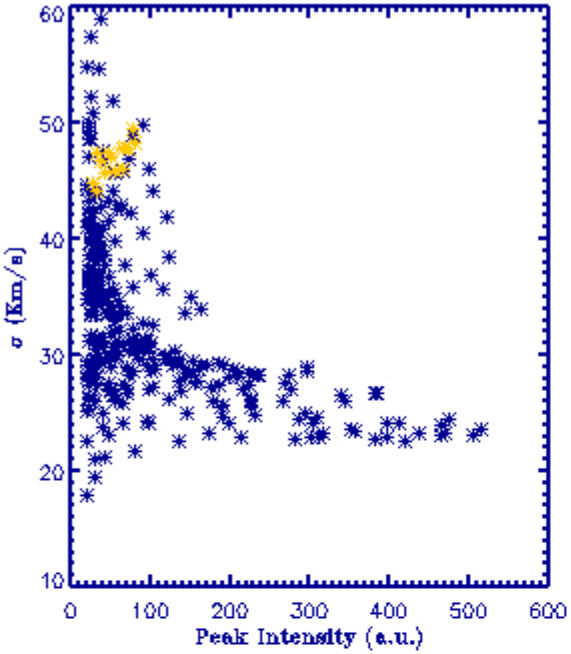

Velocity Dispersion
σ (km/s)

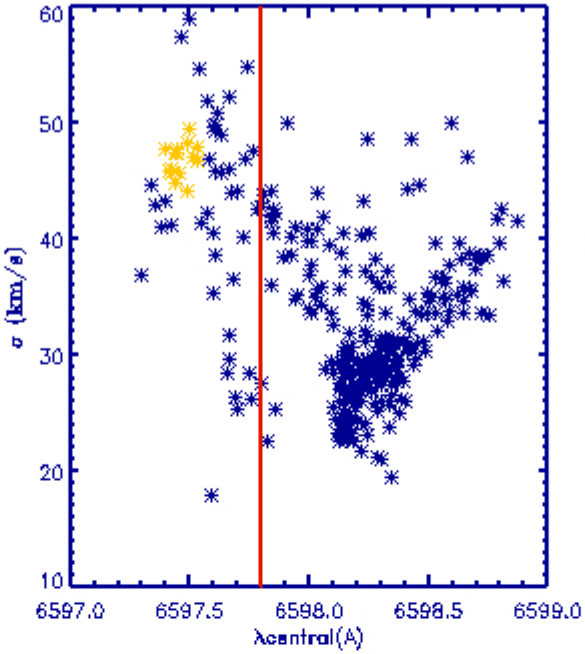

Peak Intensity

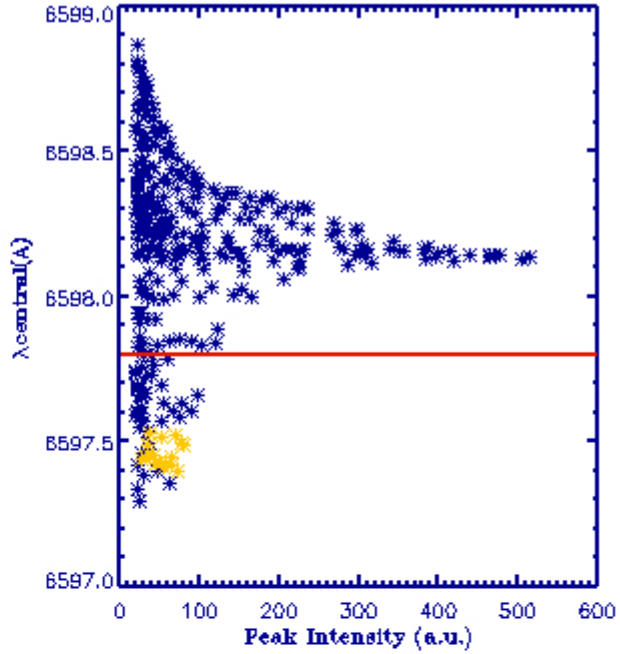

Peak Intensity

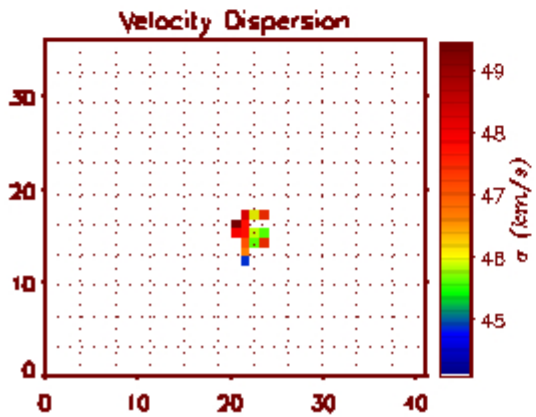
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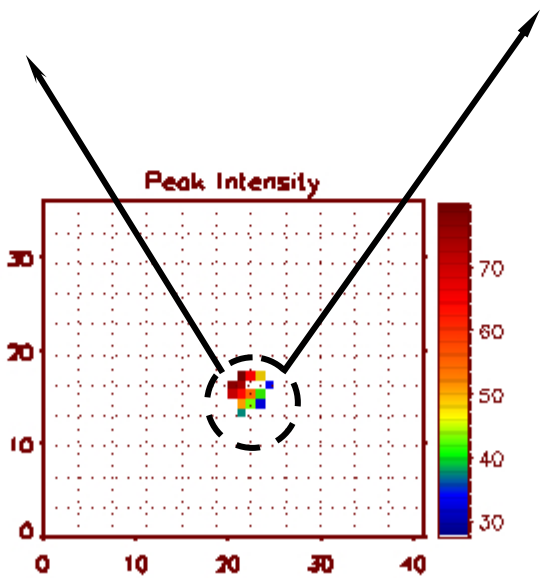


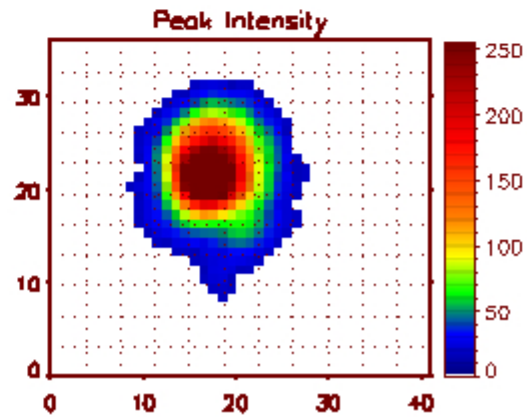

σ (Km/s)
Peak Intensity (a.u.)

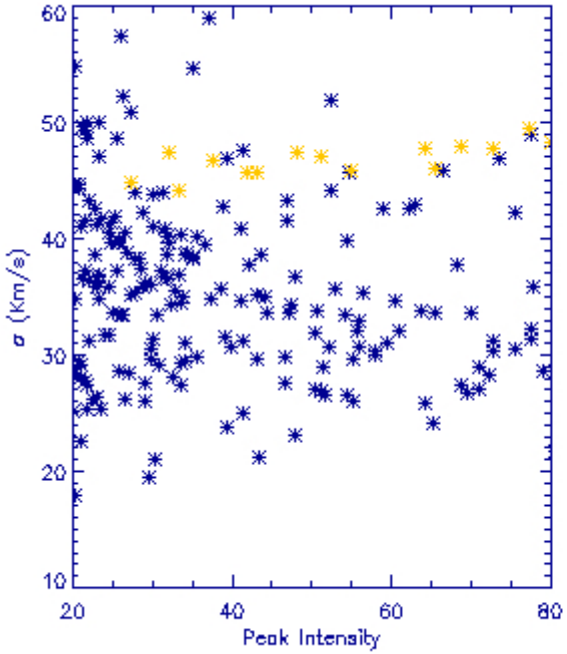

σ (km/s)
λcentral(A)

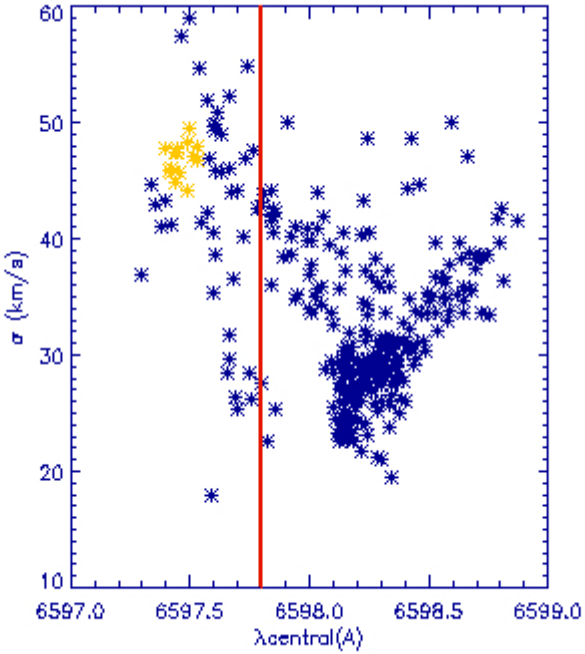

λcentral(A)
Peak Intensity (a.u.)

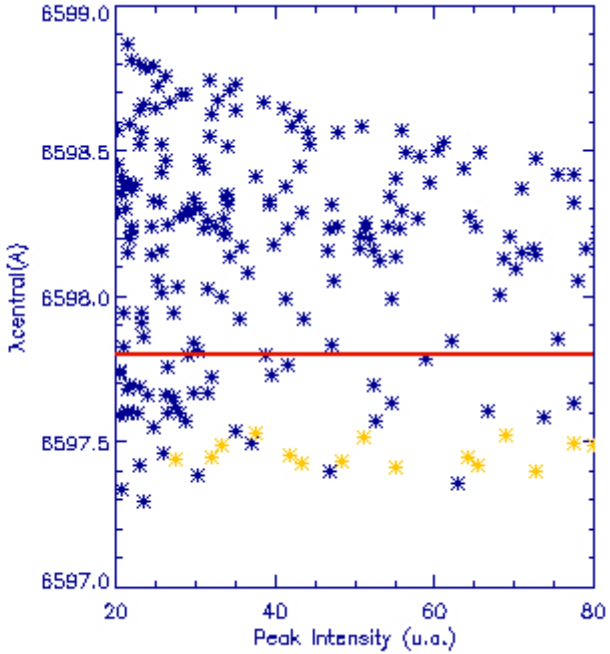

Velocity Dispersion
σ (km/s)

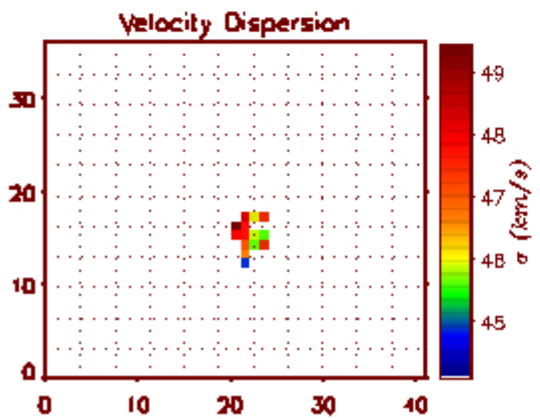

Peak Intensity

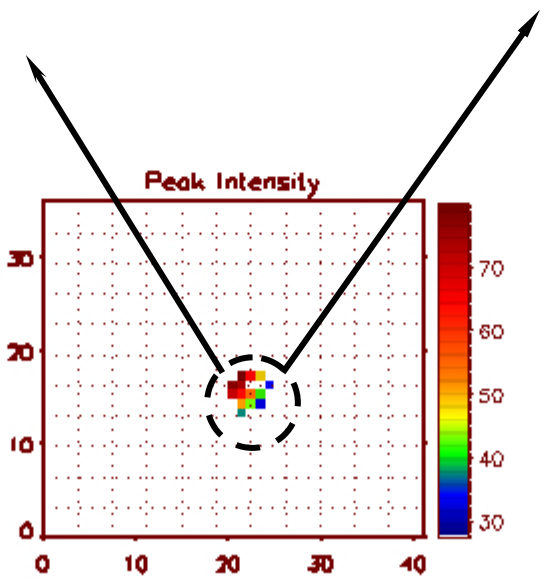

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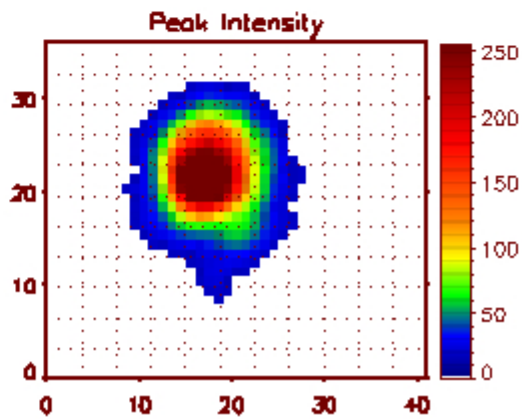

σ (Km/s)
Peak Intensity

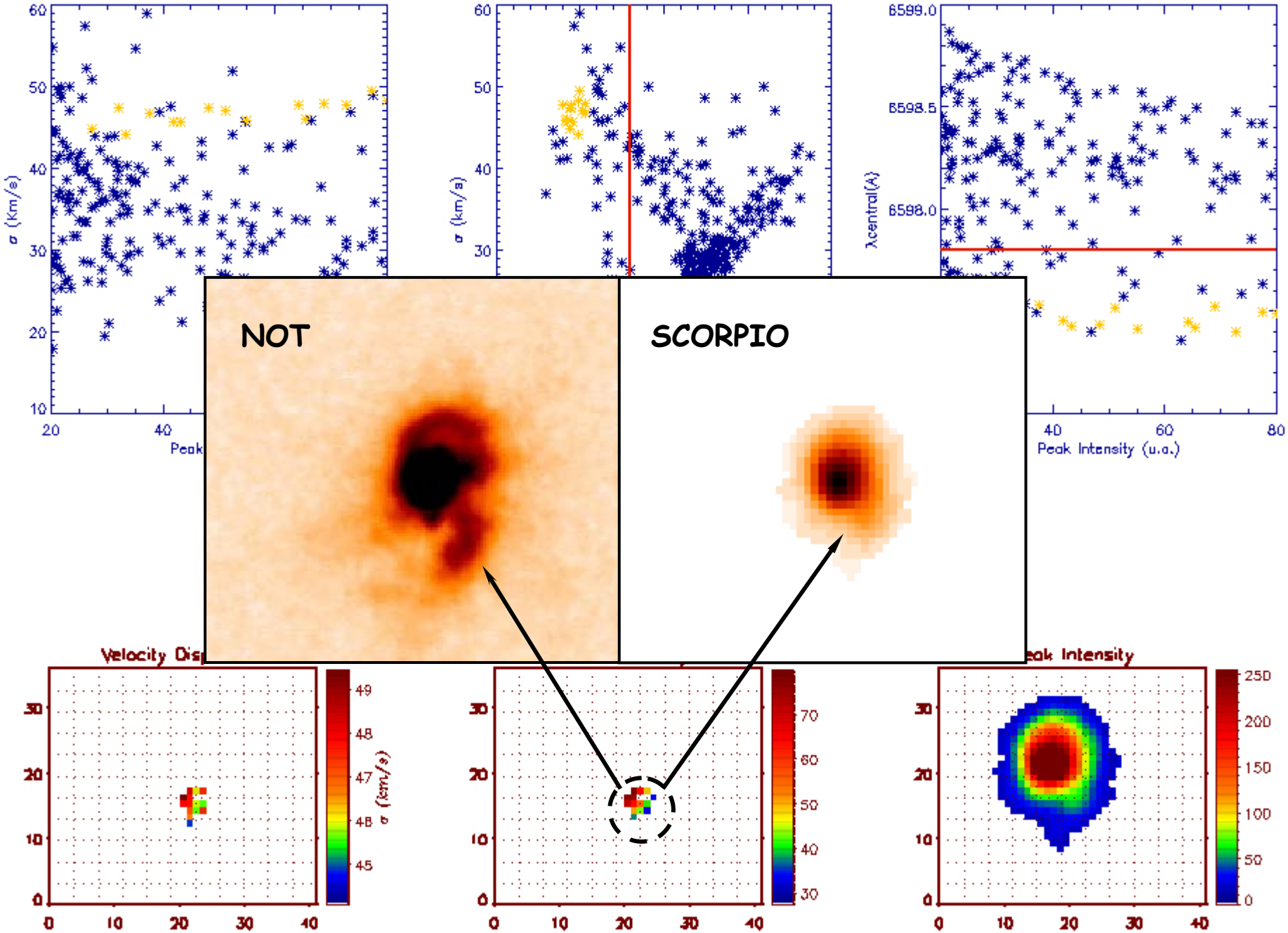

σ (km/s)
λcentral(A)


λcentral(A)
Peak Intensity (u.a.)

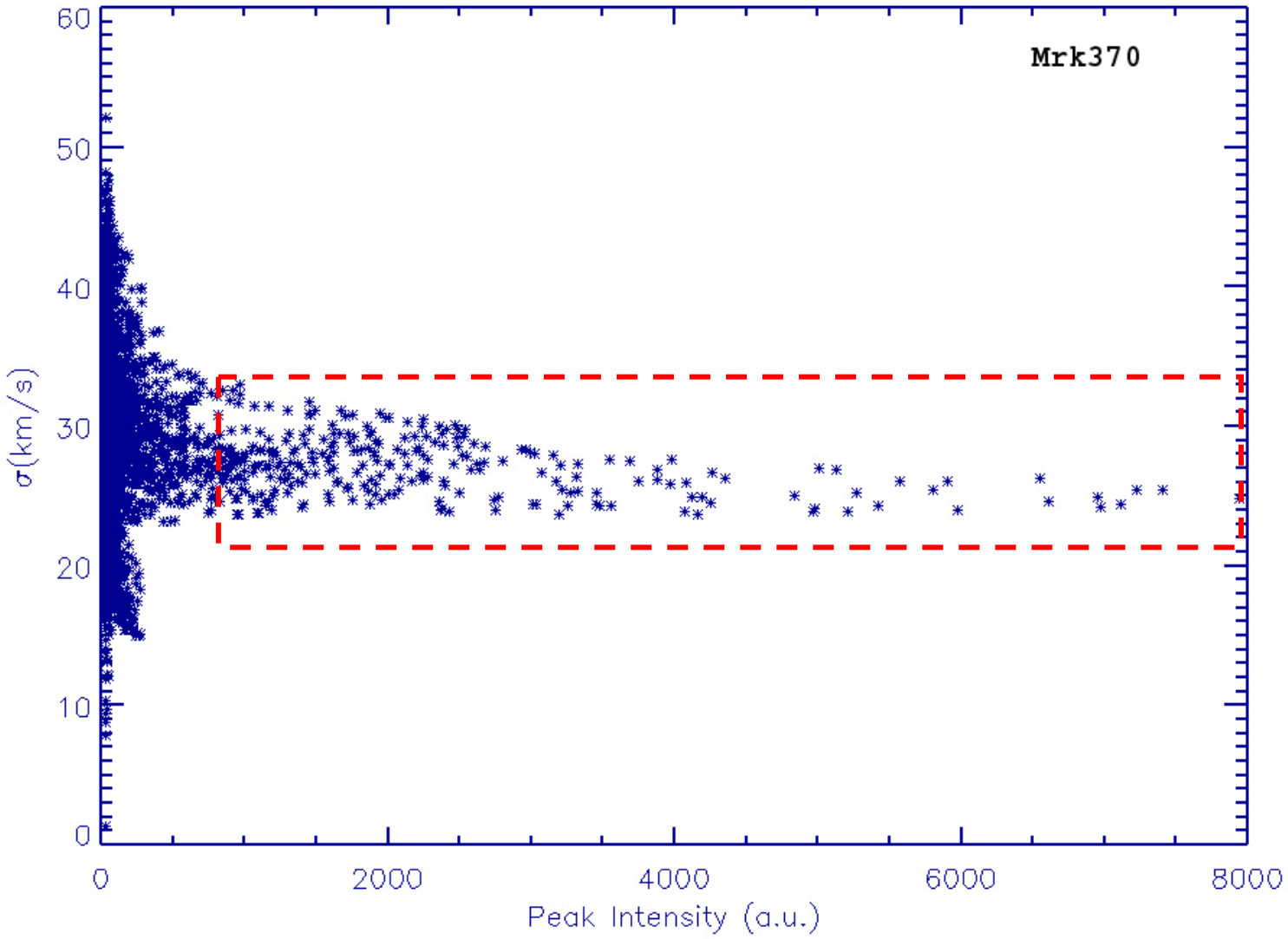

Velocity Dispersion
σ (km/s)

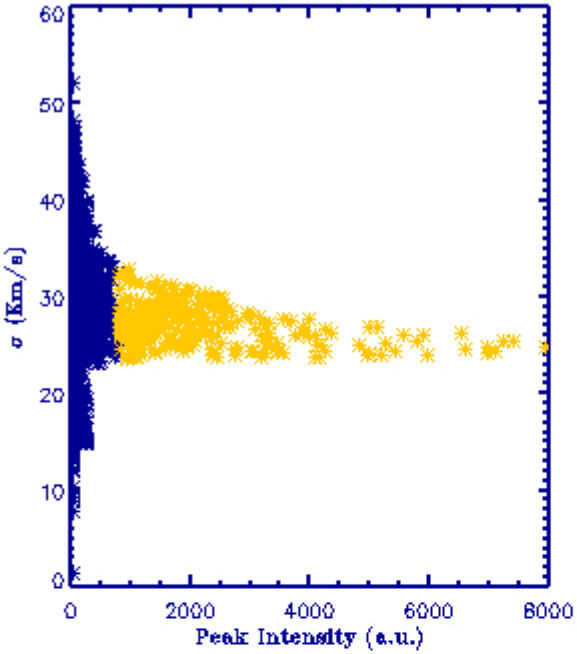

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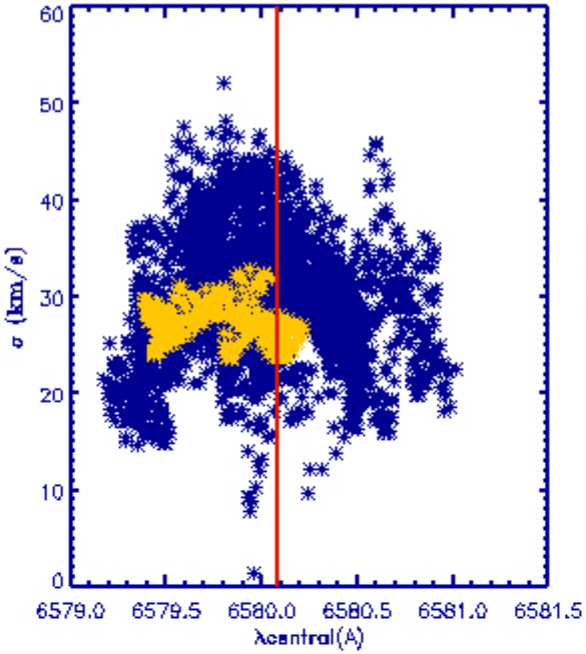

Peak Intensity

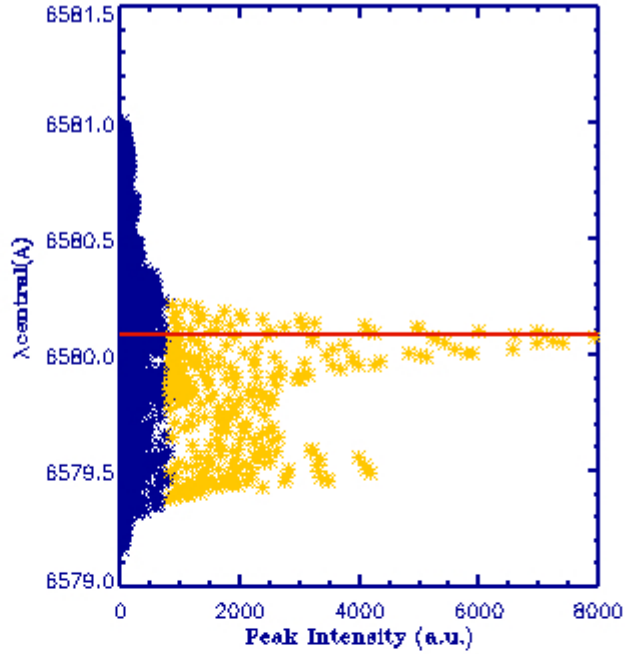

σ (Km/s)
σ (km/s)
λcentral(A)
6599.0
6598.5
6598.0
Peak Intensity (u.a.)
NOT
SCORPIO
Velocity Disp
eak Intensity
σ (km/s)

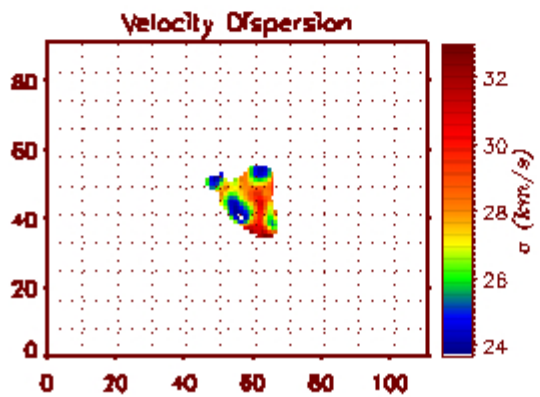
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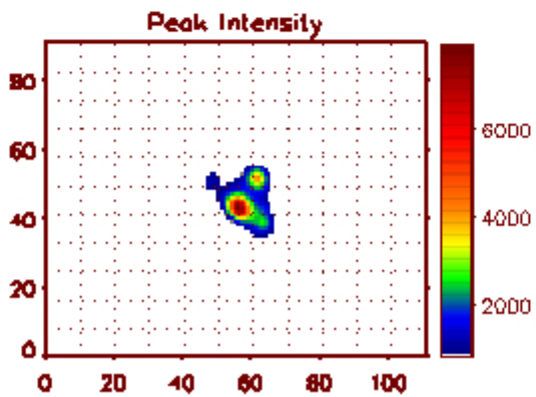


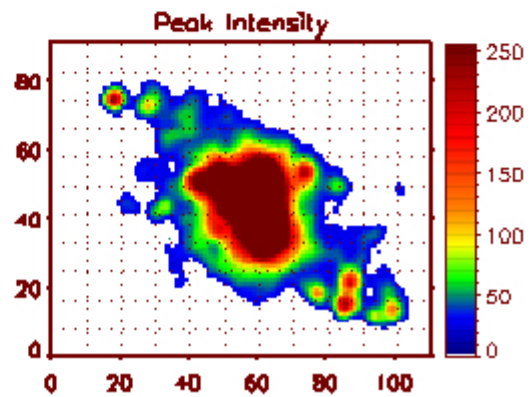

σ (Km/s)
Peak Intensity (a.u.)

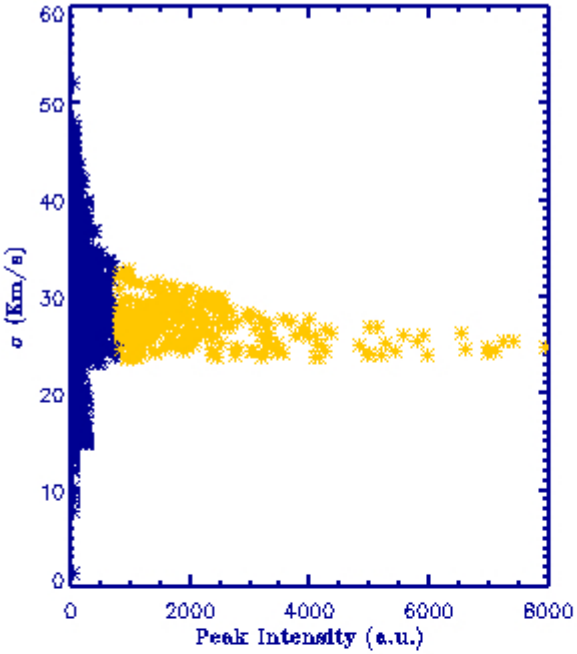

σ (km/s)
λcentral(A)

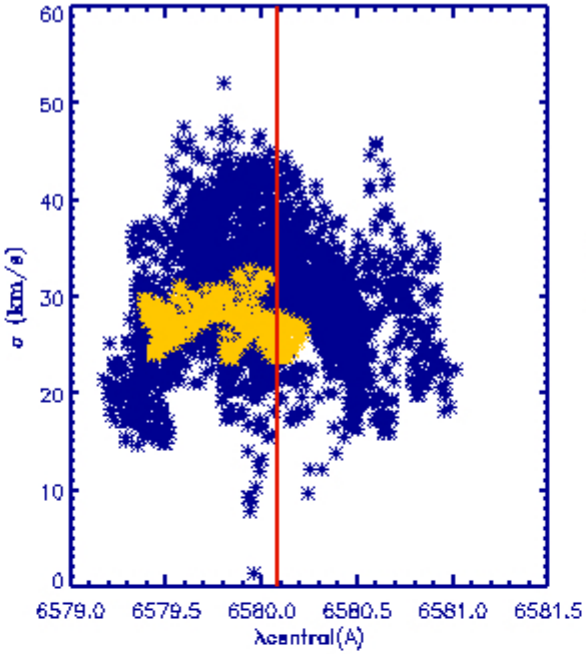

λcentral(A)
Peak Intensity (a.u.)

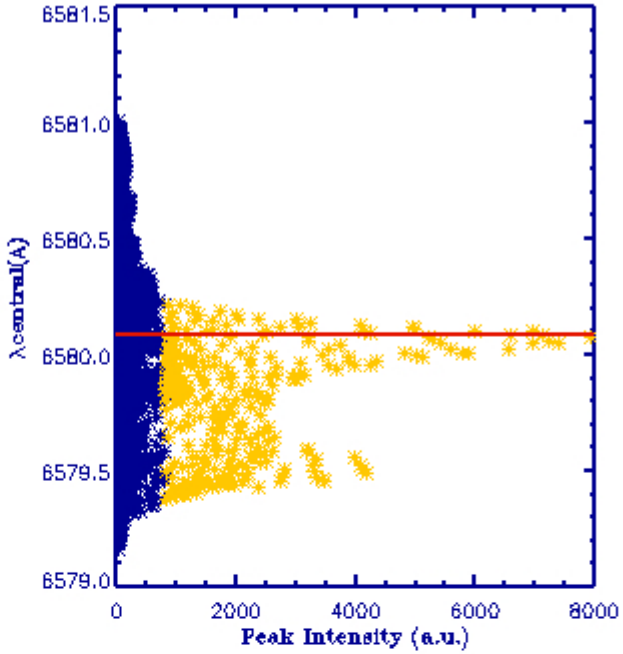

Velocity Dispersion
σ (km/s)

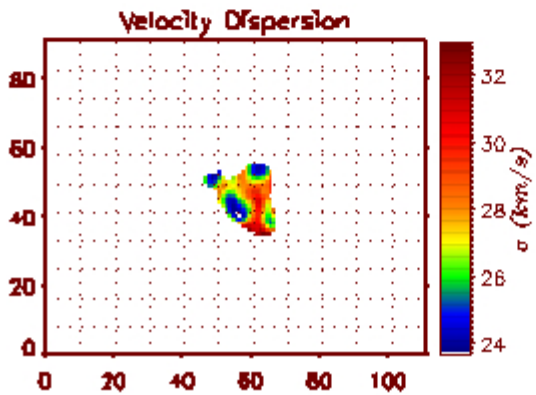

Peak Intensity

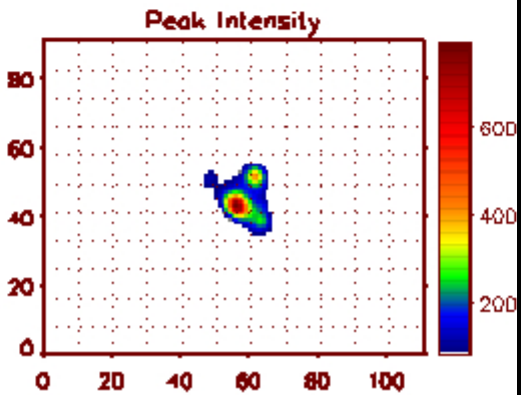

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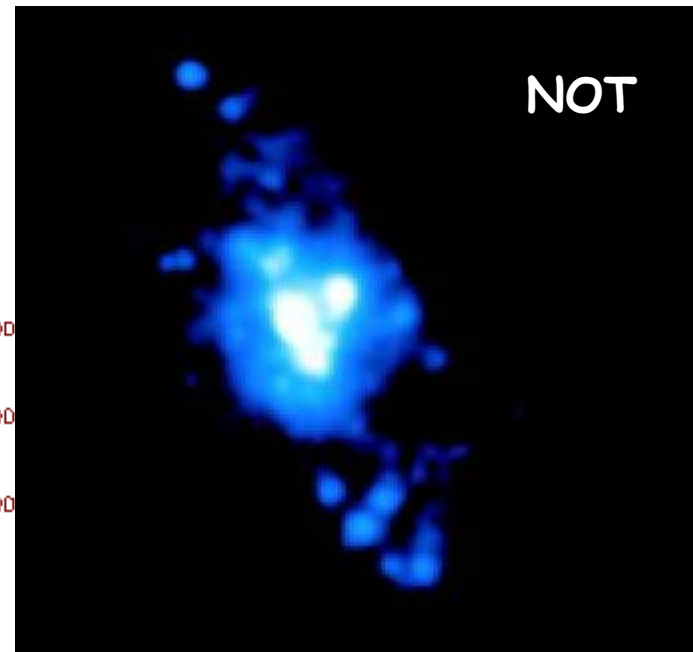

σ (Km/s)
Peak Intensity (a.u.)


σ (km/s)
λcentral(A)

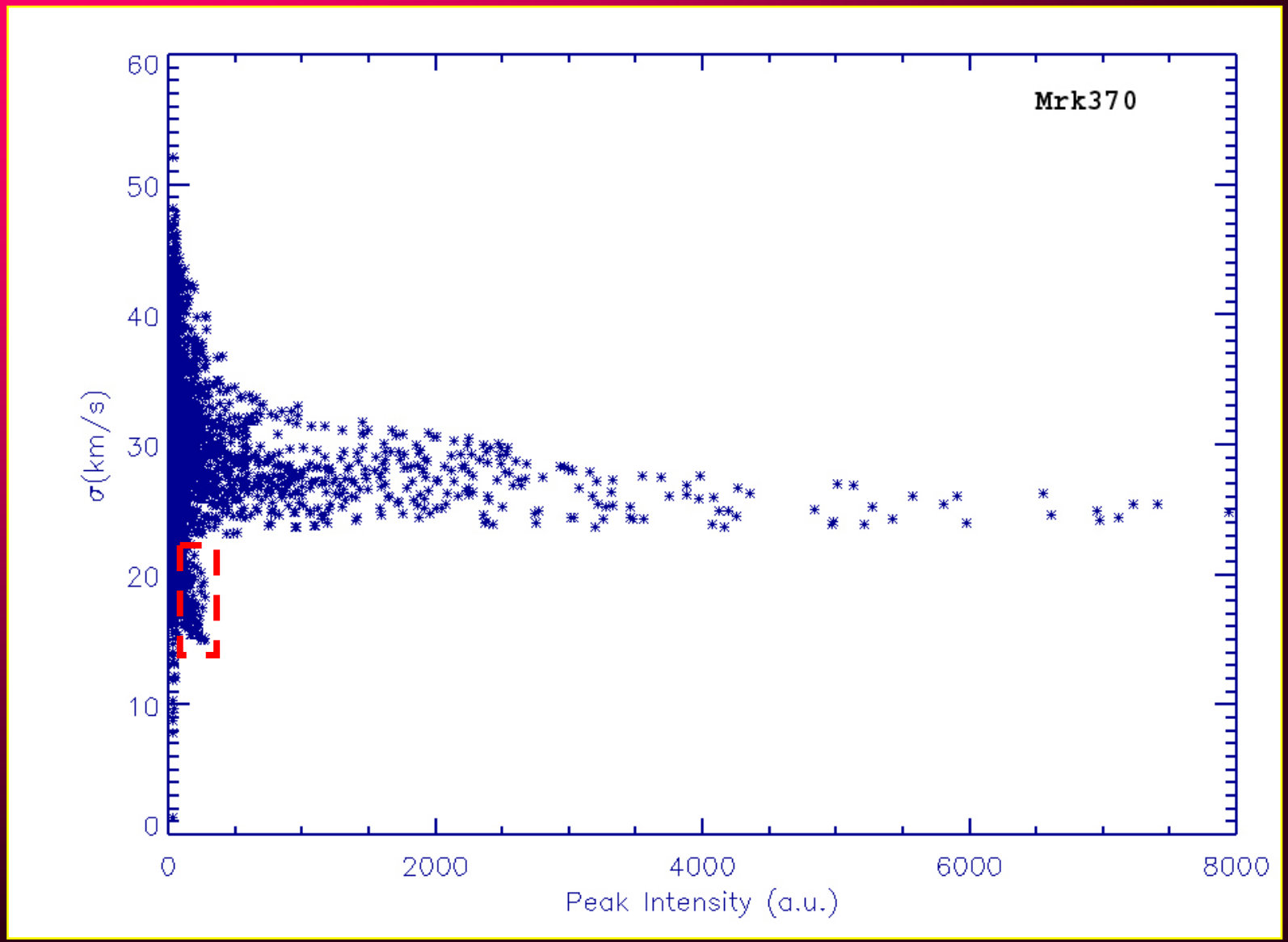

λcentral(A)
Peak Intensity (a.u.)

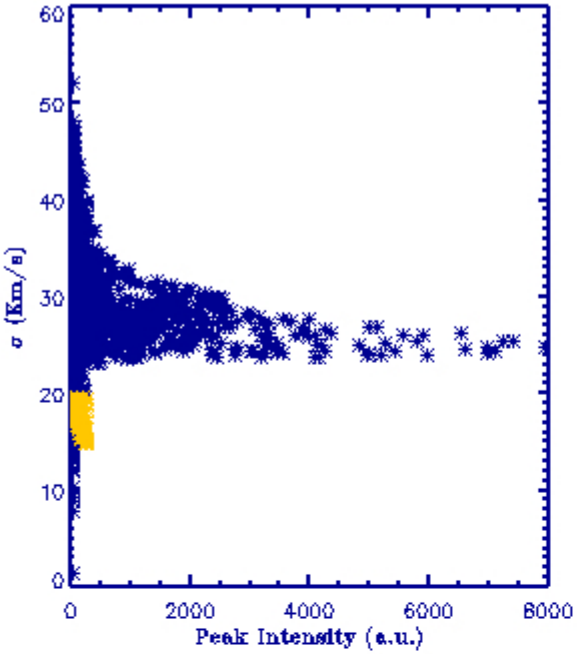

Velocity Dispersion
σ (km/s)

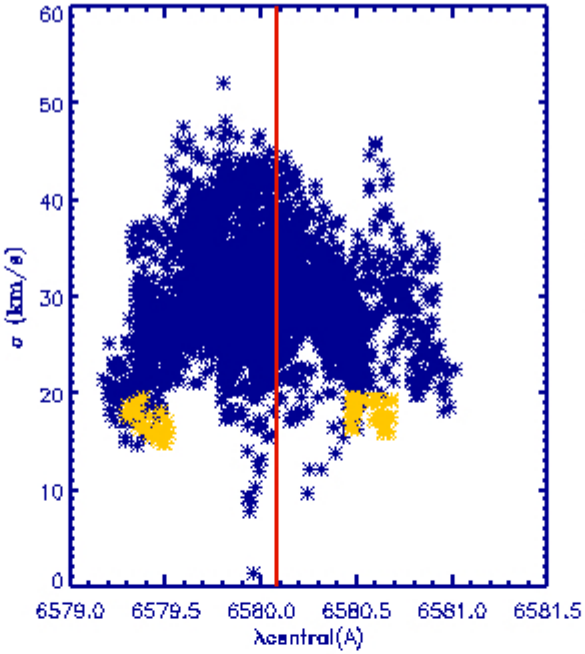

Peak Intensity

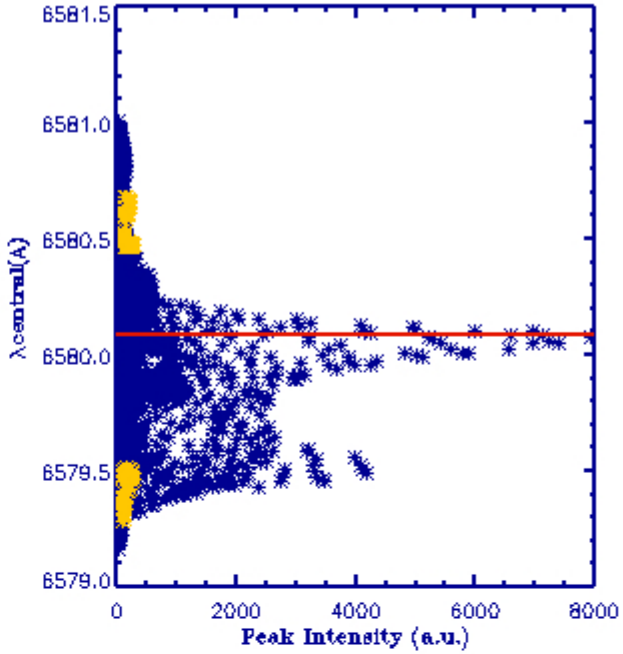

NOT

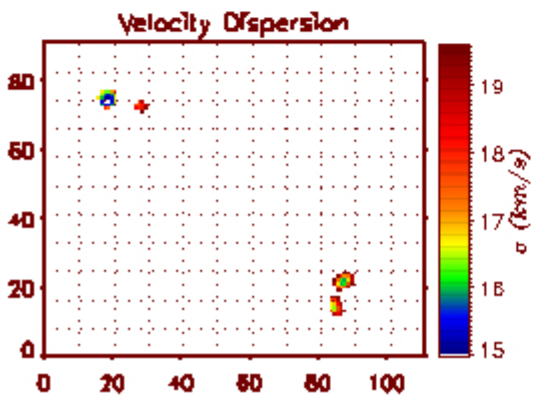
3D Spectroscopy of Blue Compact Dwarf Galaxies (BCDs)

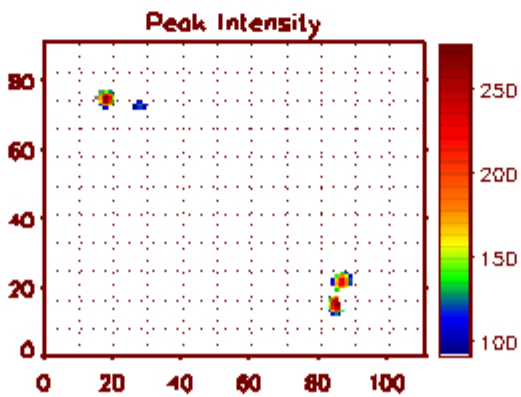


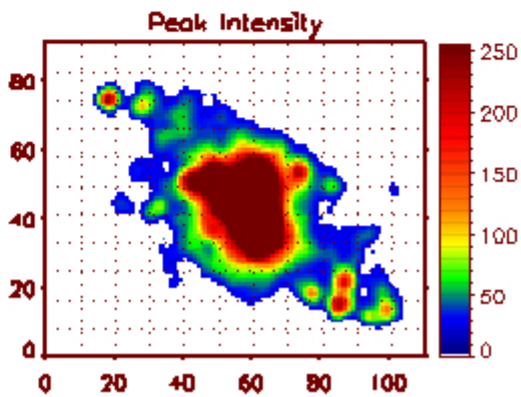

σ (Km/s)
Peak Intensity (a.u.)

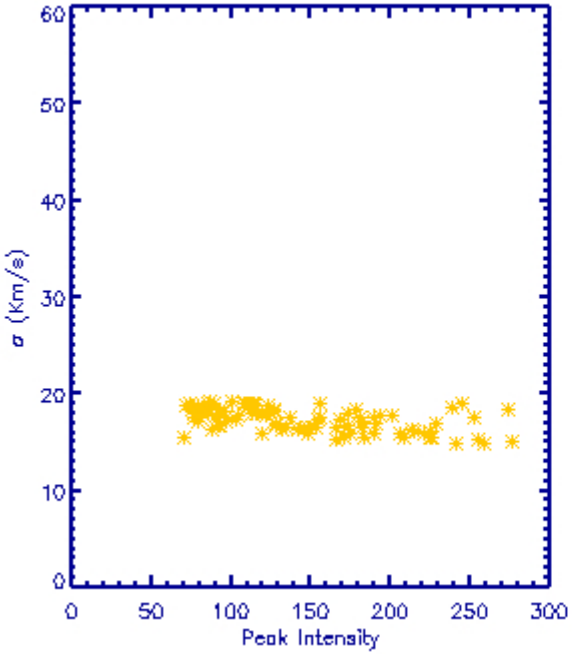

σ (km/s)
λcentral(A)

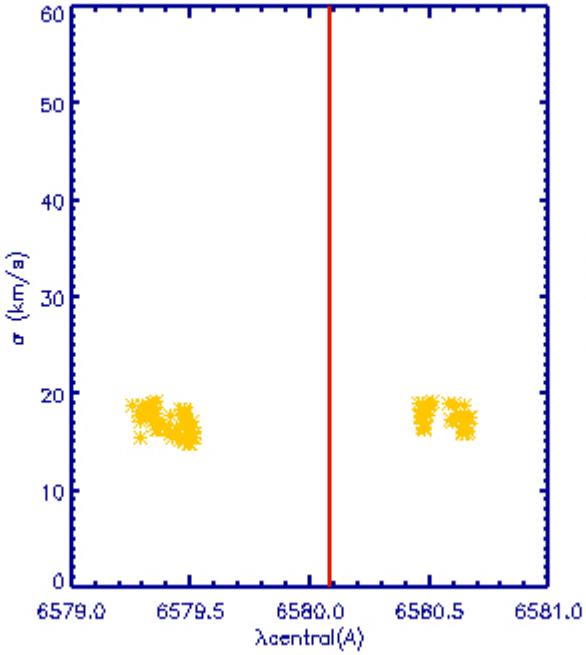

λcentral(A)
Peak Intensity (a.u.)

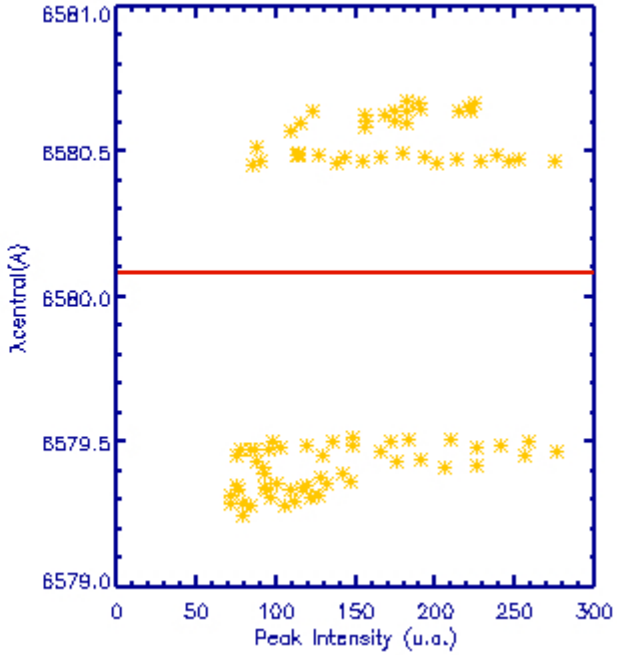

Velocity Dispersion
σ (km/s)

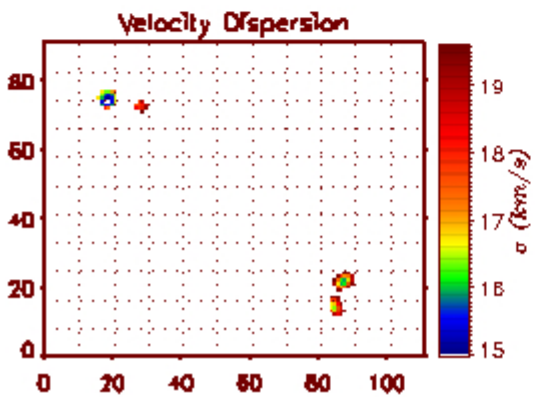

Peak Intensity

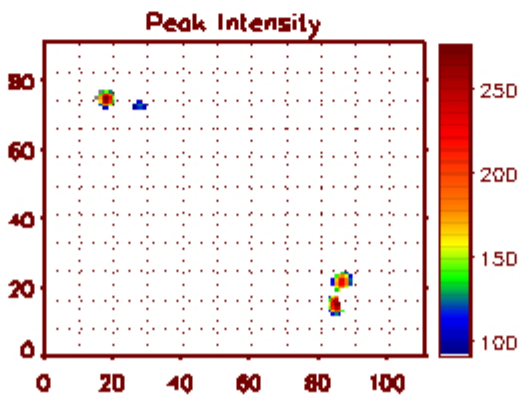

Peak Intensity

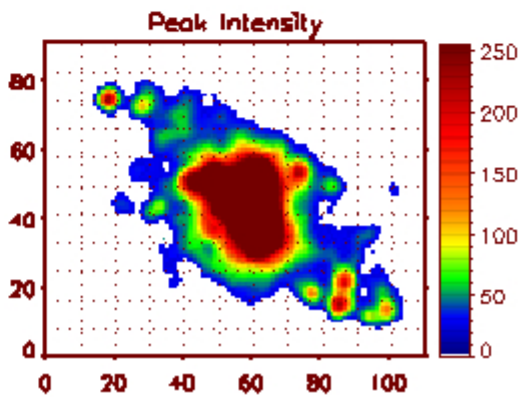

σ (Km/s)
Peak Intensity


σ (km/s)
λcentral(A)

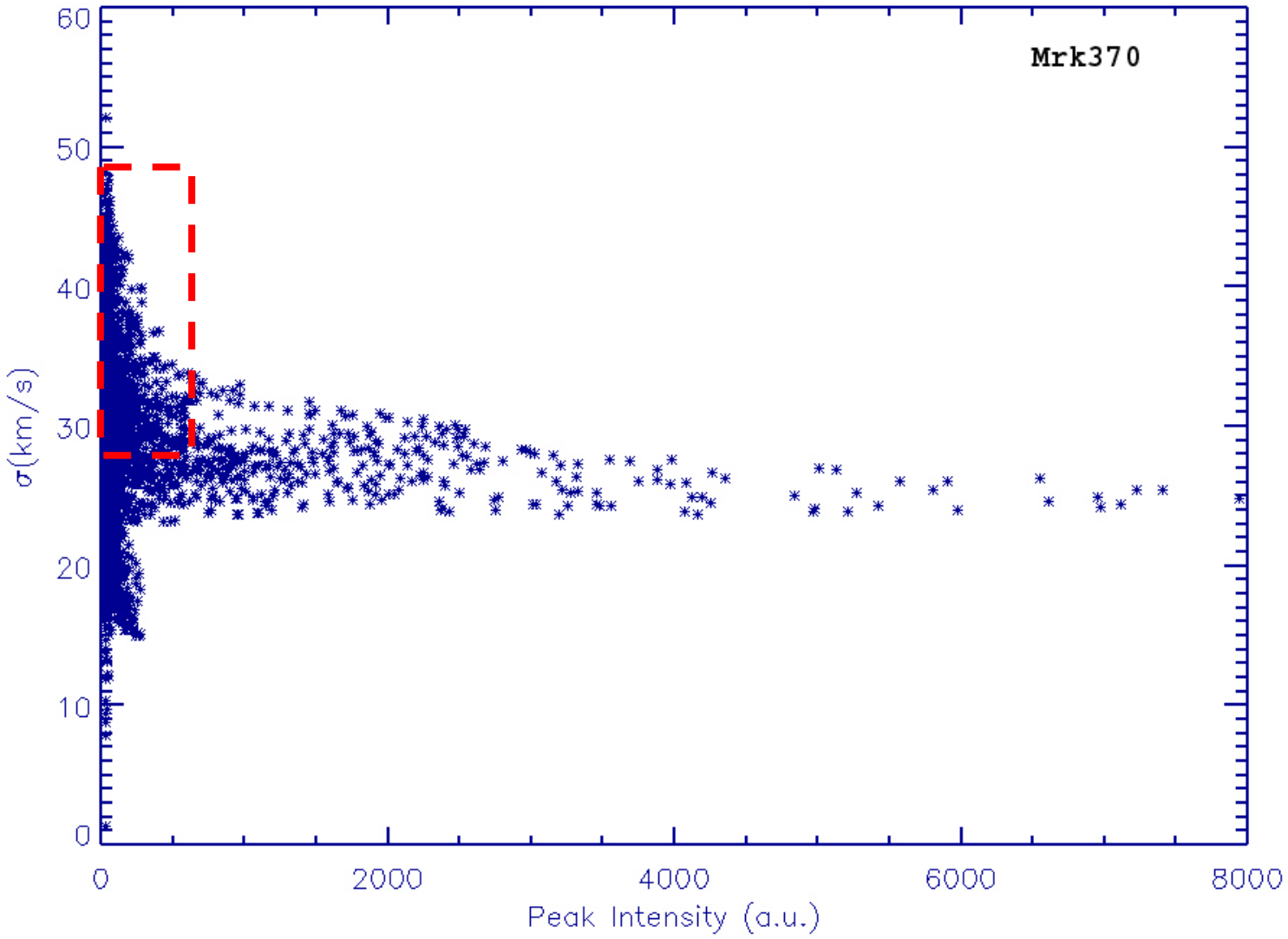

λcentral(A)
Peak Intensity (u.a.)

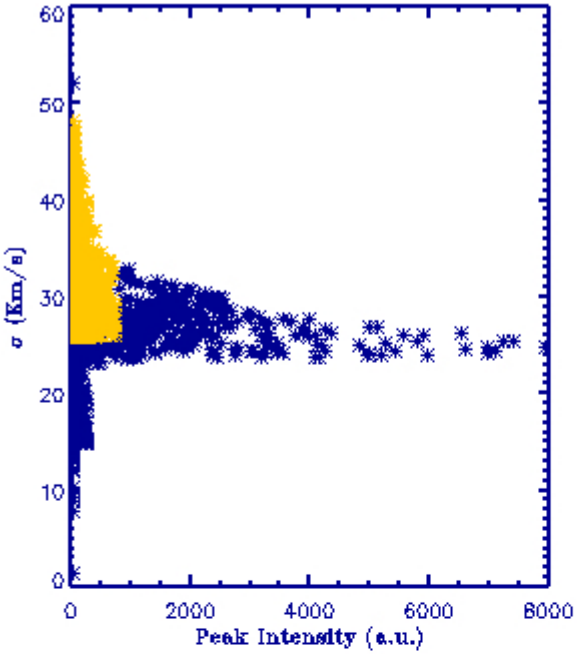

Velocity Dispersion
σ (km/s)

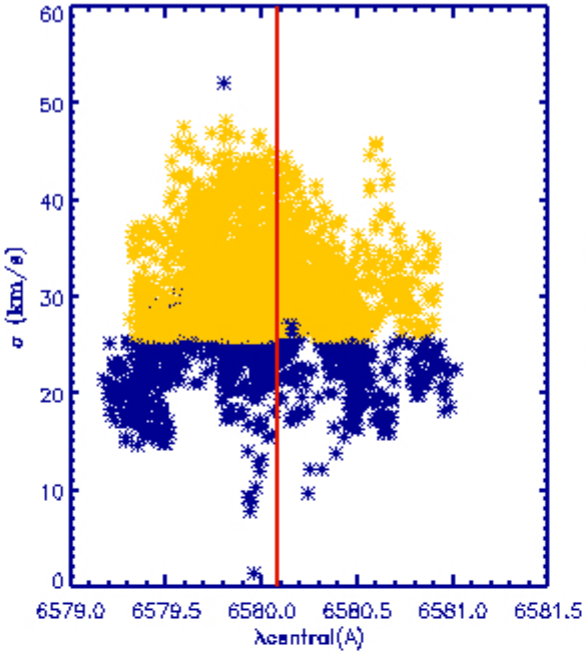

Peak Intensity

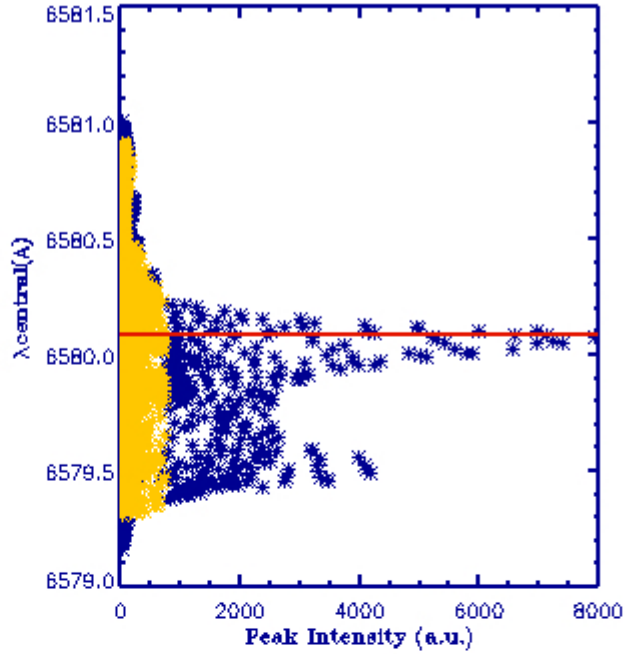

Peak Intensity

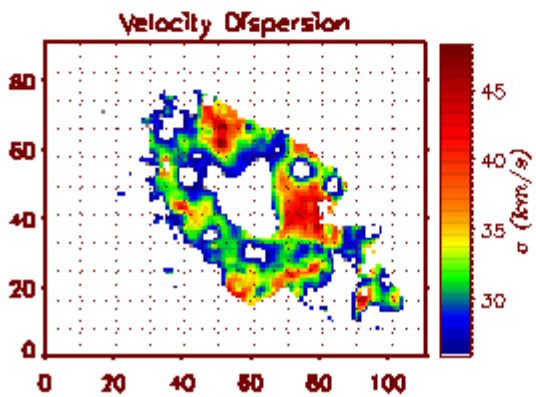
3D Spectroscopy of Blue Compact Dwarf Galaxies (BCDs)

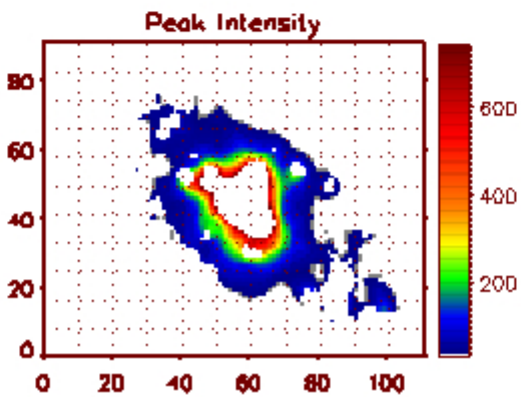


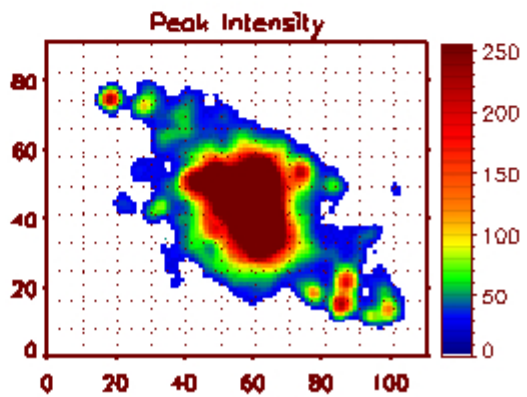

σ (Km/s)
Peak Intensity (a.u.)


σ (km/s)
λcentral(A)


λcentral(A)
Peak Intensity (a.u.)


Velocity Dispersion
σ (km/s)


Peak Intensity


Peak Intensity

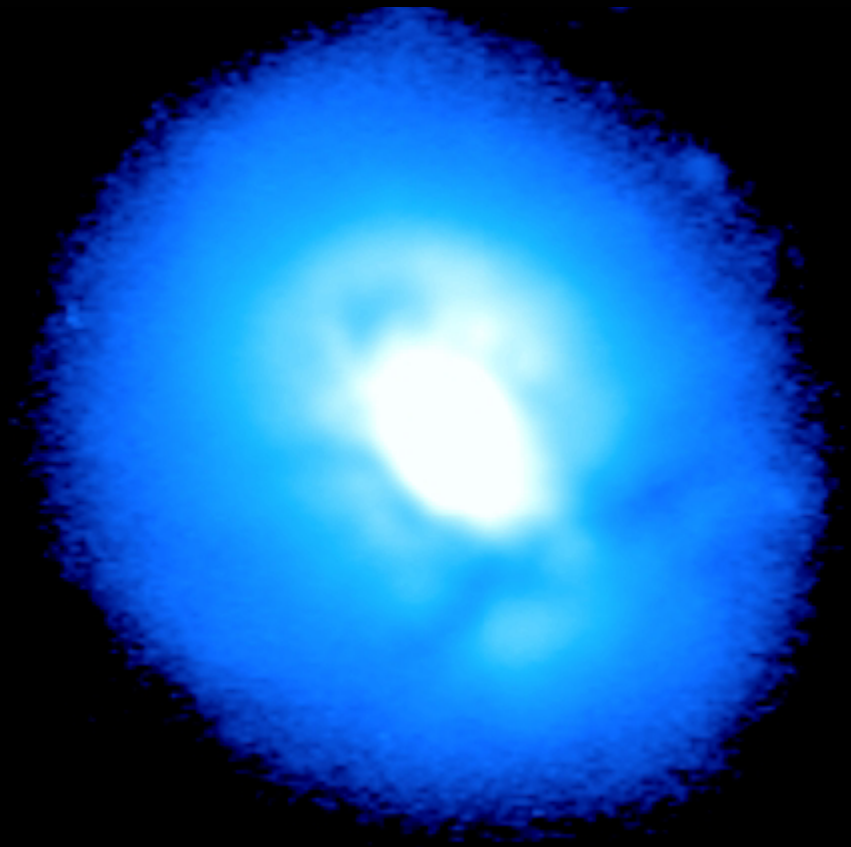
Conclusions

We have elaborated several diagnostic diagrams that can be useful for working with spectroscopy data of galaxies in poor spatial resolution and for identifying starburst knots.

- Most of the ionized gas in BCDs have supersonic velocities.
- We can identified the kinematic cores and/or starburst knots.
- We can identified all those points in wich the emission line profiles show asymmetries and double peak signatures as inclined bands, associated with structures such as bubbles, shells or possible supergalactic winds.
- The σ vs λc diagram is useful to avoid missidentifications of different kinematics cores.

3D Spectroscopy of Blue Compact Dwarf Galaxies (BCDs)

Estallidos IV



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Madrid, 26 de Enero de 2006