

遠方銀河分光観測のシミュレーション

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Spectroscopy Simulation

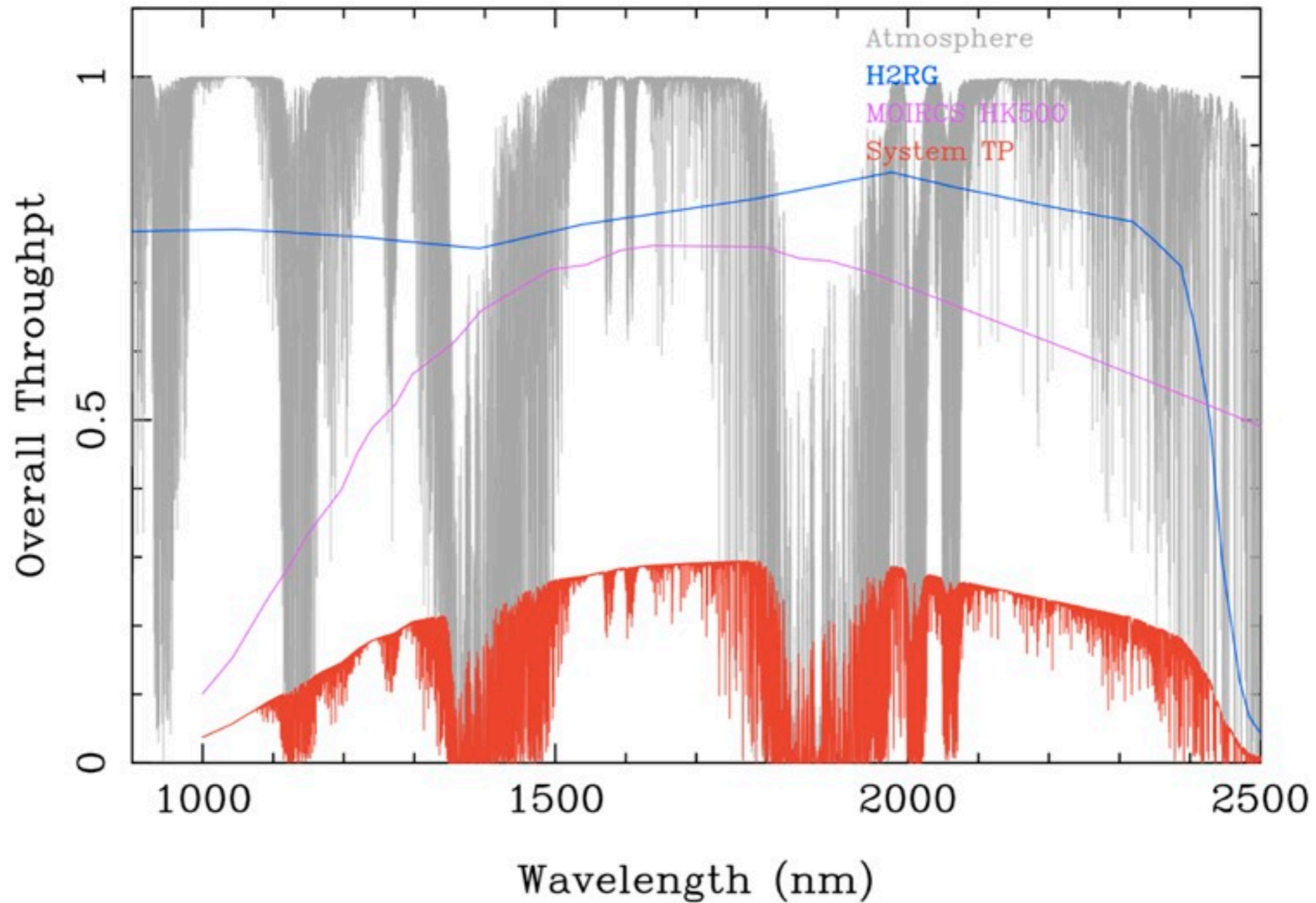
- Spectrograph:

- 7.5AA Dispersion ($R \sim 2500$ at $2.2 \mu\text{m}$), 3.75AA Dispersion
- Spatial Sampling: 0.06" or 0.12"
- Coverage: 1.3 - 2.5 μm
- Dark: 0.1 e-/sec
- Read-noise: 10e-/pix

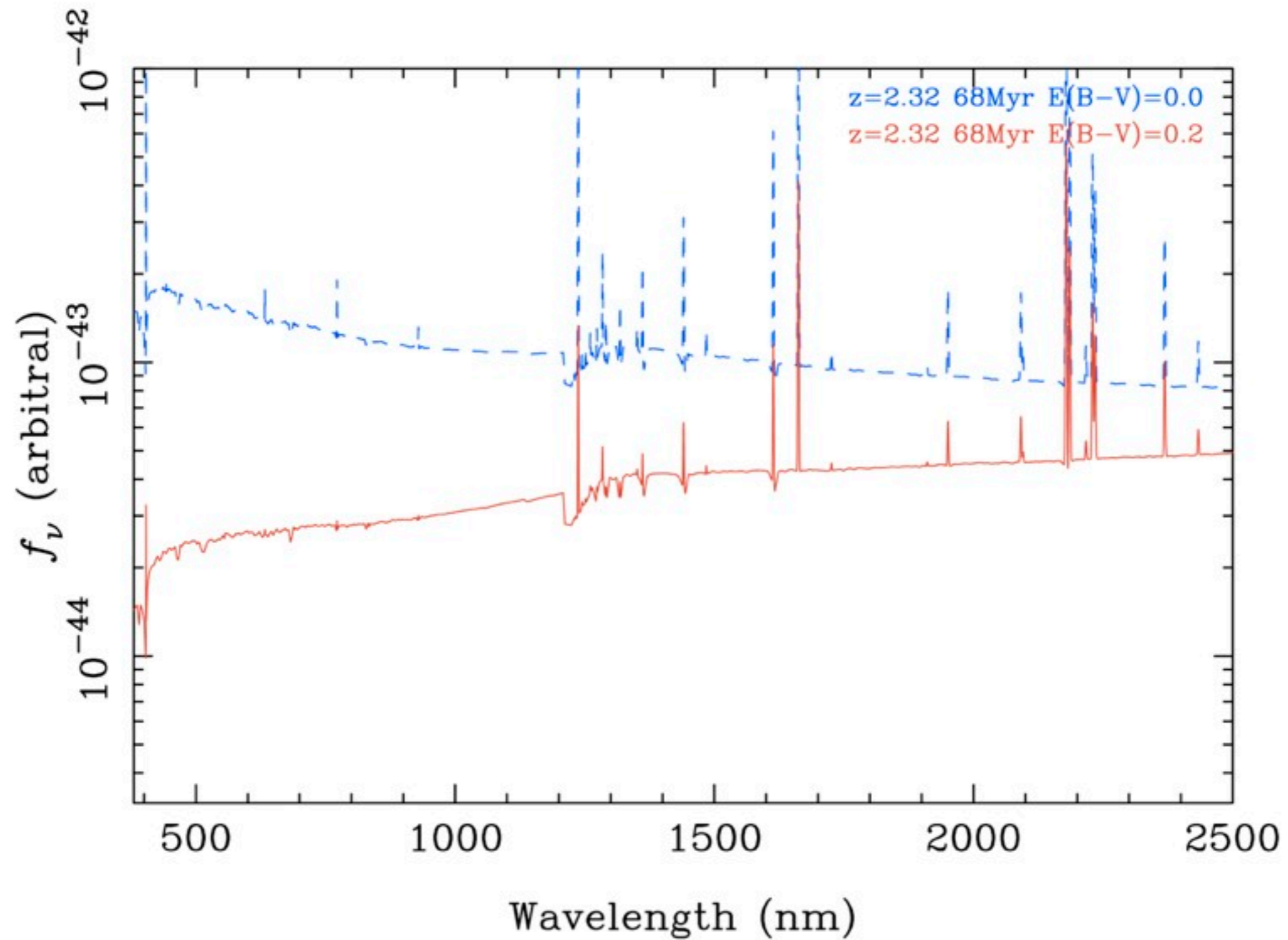
- Throughput:

- 5 optical components for spectrograph, each 90%
- Primary and secondary mirrors, each 90%
- Disperser: MOIRCS HK500 Grism
- H2RG QE from Teledyne

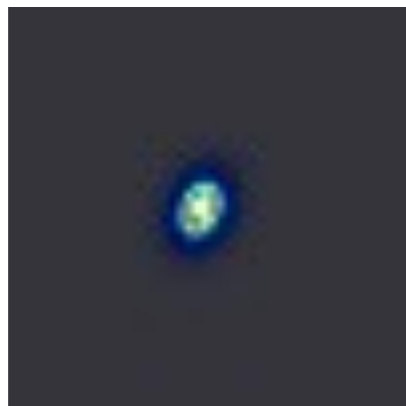
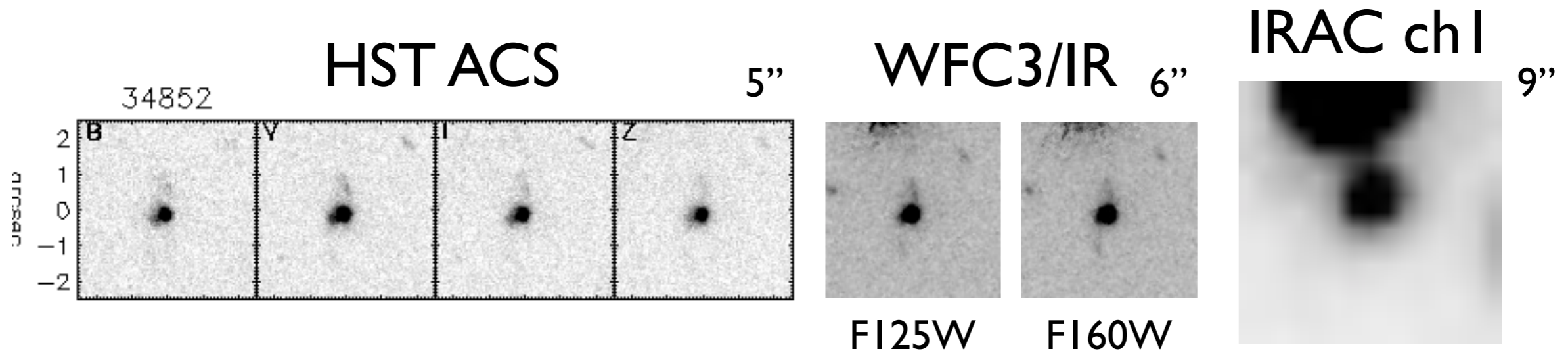
Assumed Throughput, Including Atmosphere



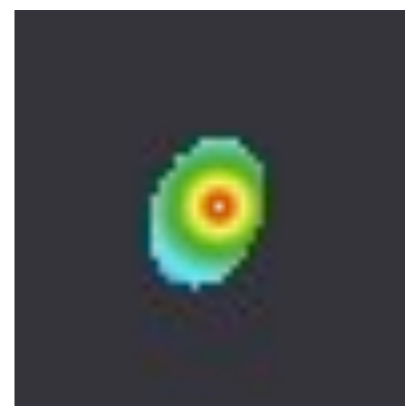
Input SED



sBzK (I) K(AB)=21.86



model by GALFIT (F160W)
Re=1.4 kpc



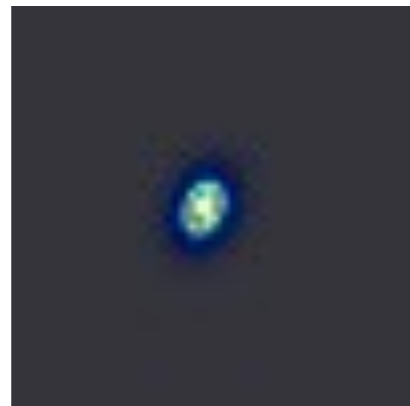
Vel. Dispersion
Peak 100 km/s



Rotation
-200 to 200 km/s

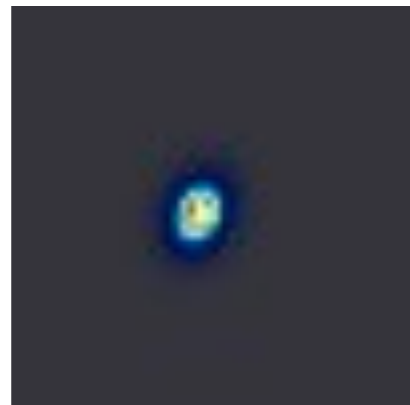
sBzK (I) $K(AB)=21.86$

Model

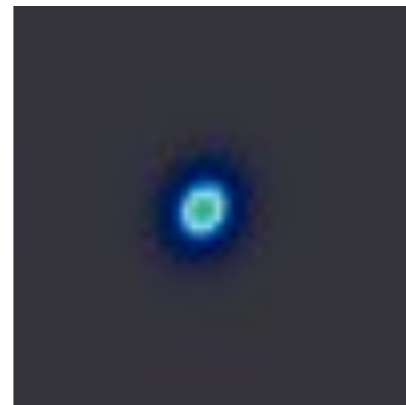


Flux

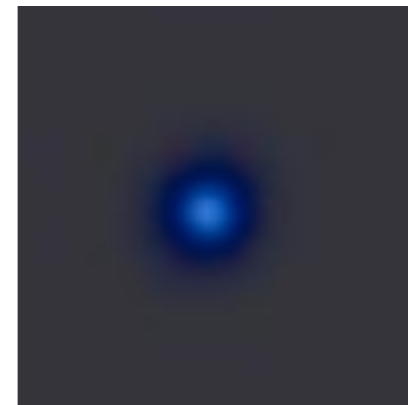
Input



Diffraction
Limited



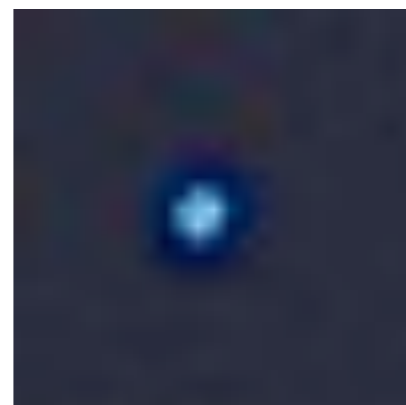
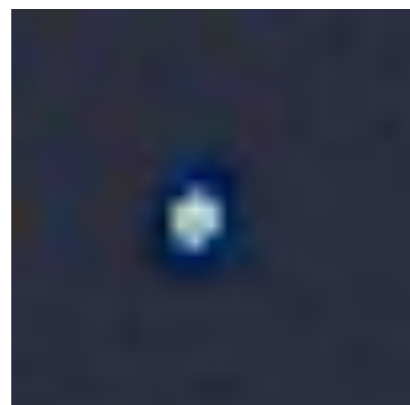
GLAO



Seeing

Condition="moderate"

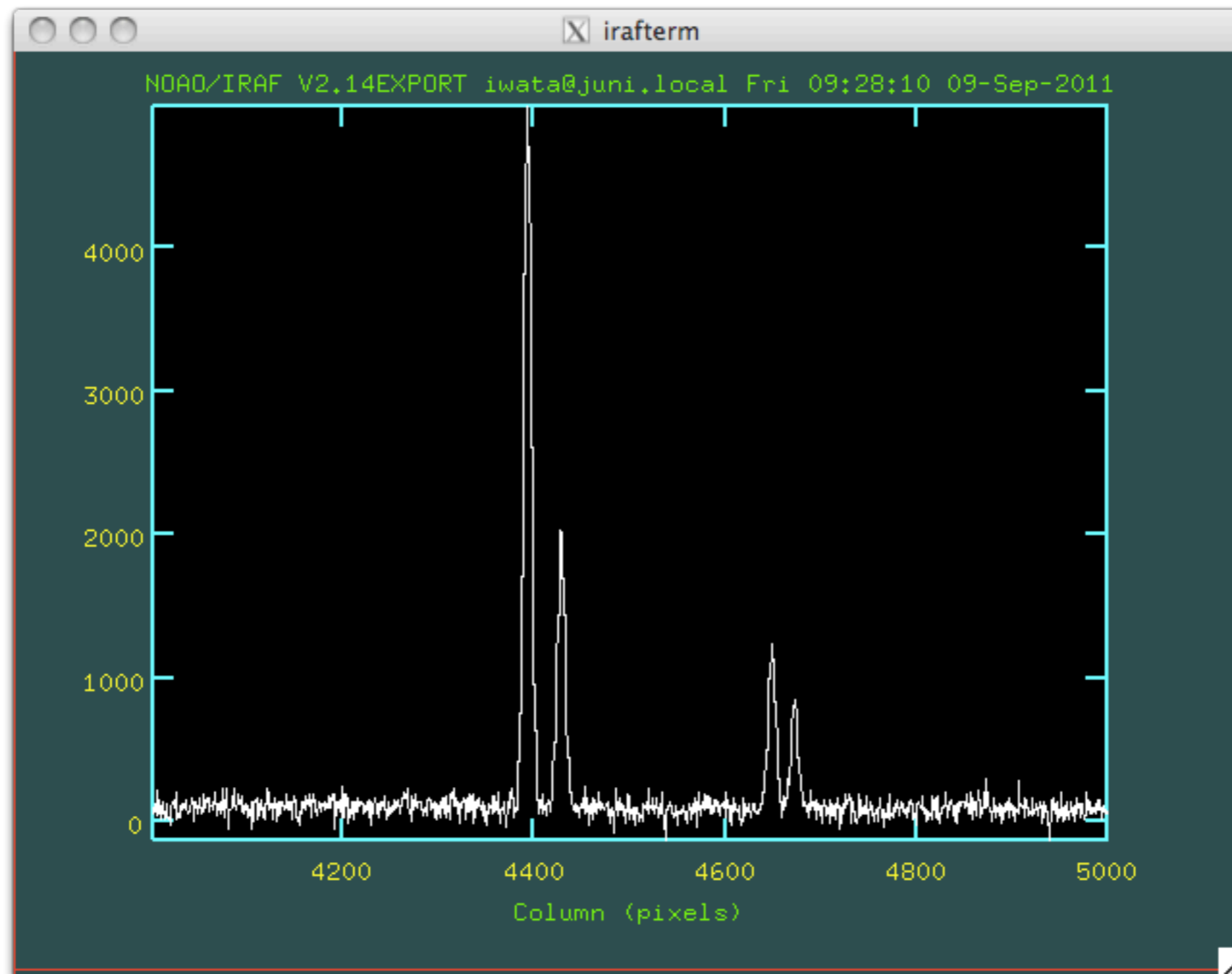
Output
S/N



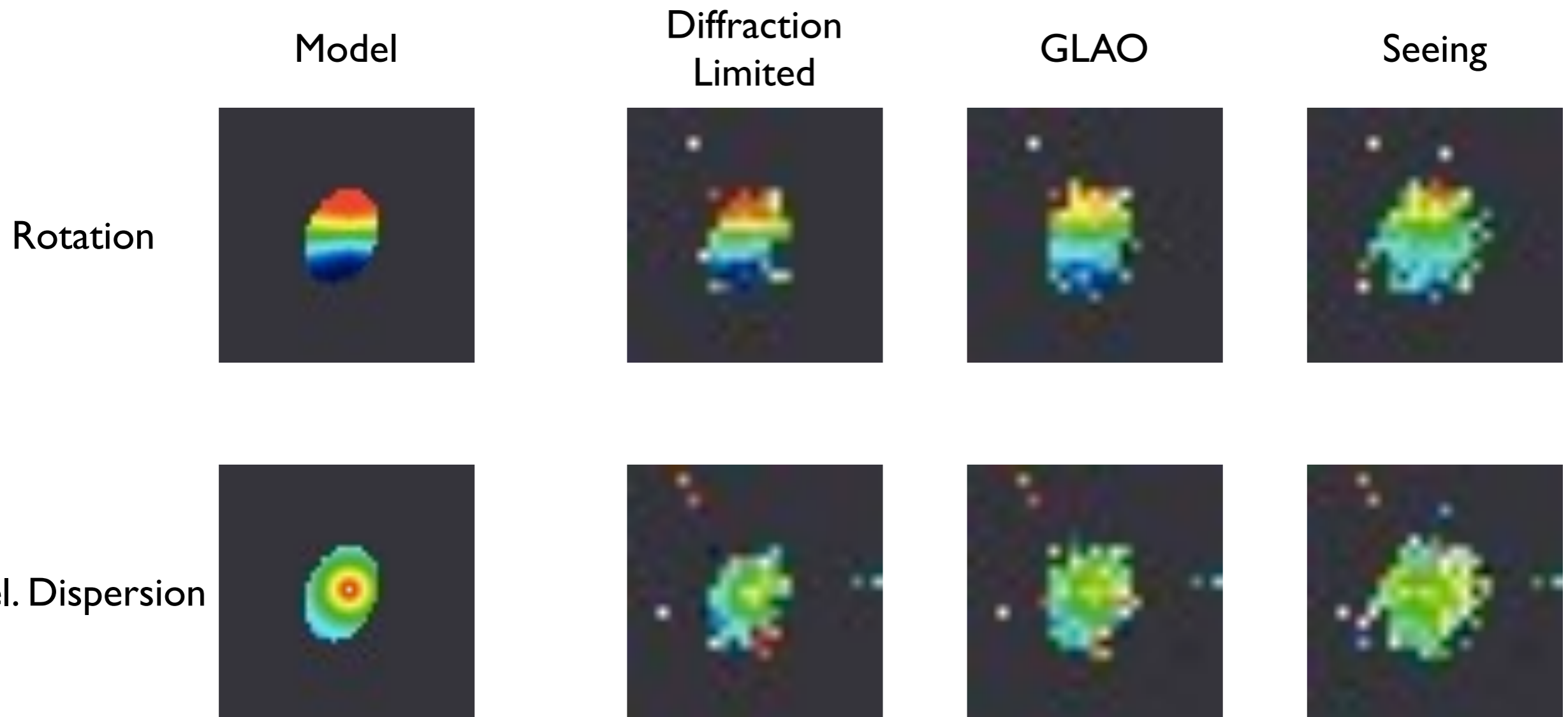
1200s x 9
0.12" Sampling



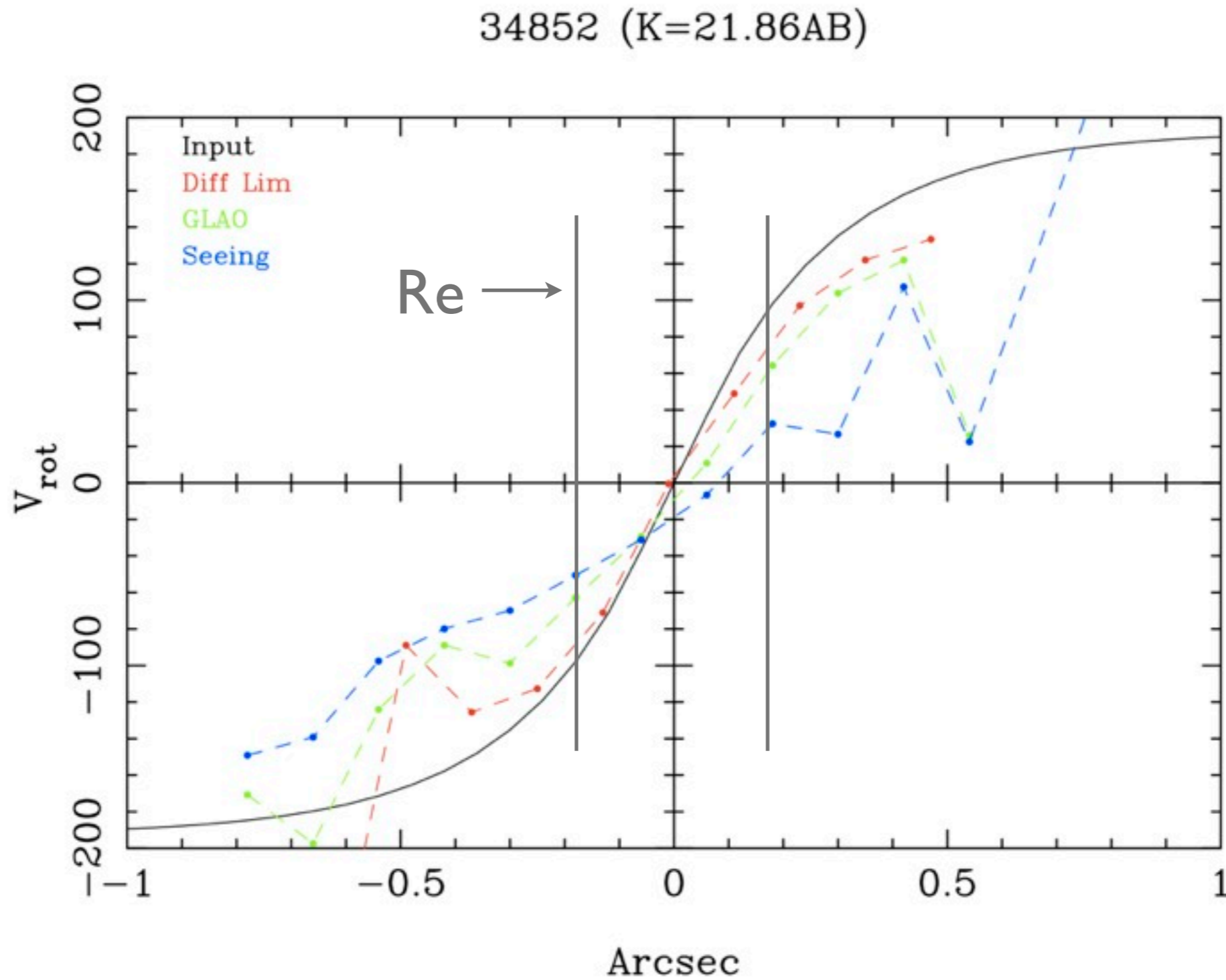
Output Spectra 1200s x 9 Center 0.12"x0.12"



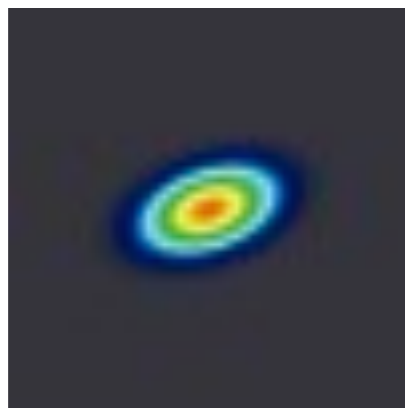
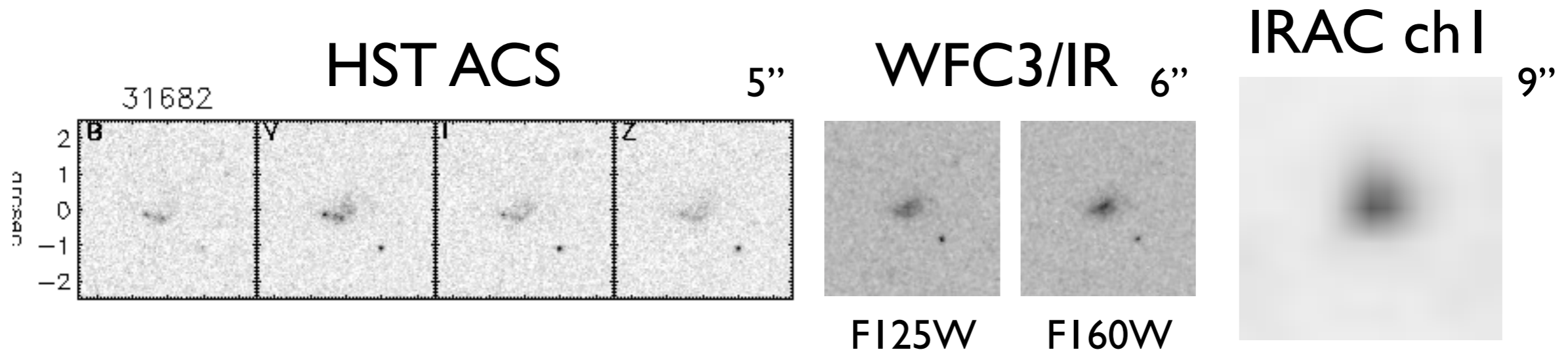
sBzK (I) K(AB)=21.86: H α Kinematics



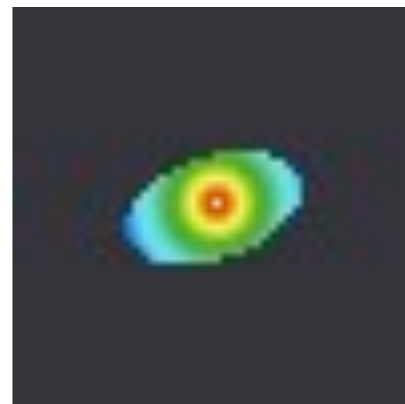
sBzK (I) K(AB)=21.86: Rotation Curve



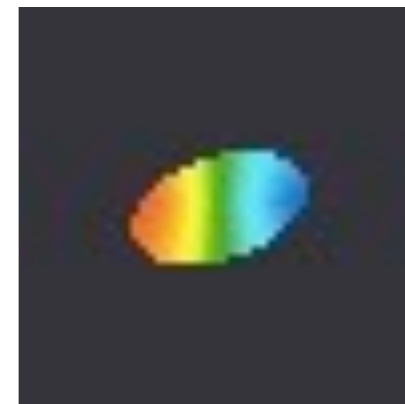
sBzK (2) K(AB)=22.75



model by GALFIT (F160W)
Re=3.0 Kpc



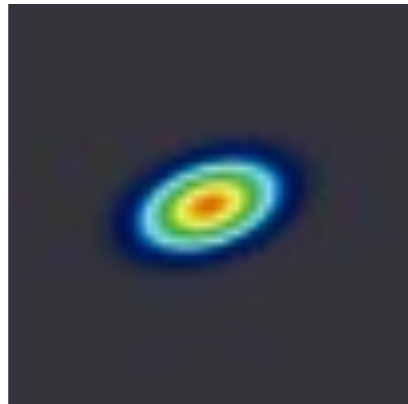
Vel. Dispersion
Peak 100 km/s



Rotation
-132 to 132 km/s

sBzK (2) $K(AB)=22.75$

Model

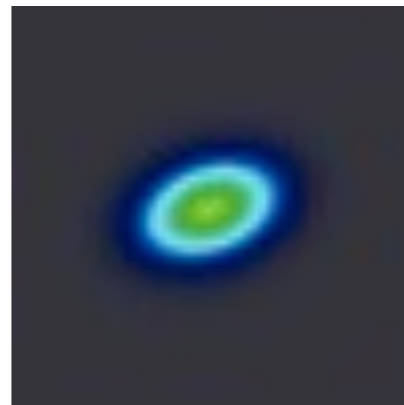


Flux

Input



Diffraction Limited



GLAO



Seeing

Condition="moderate"

Output
S/N



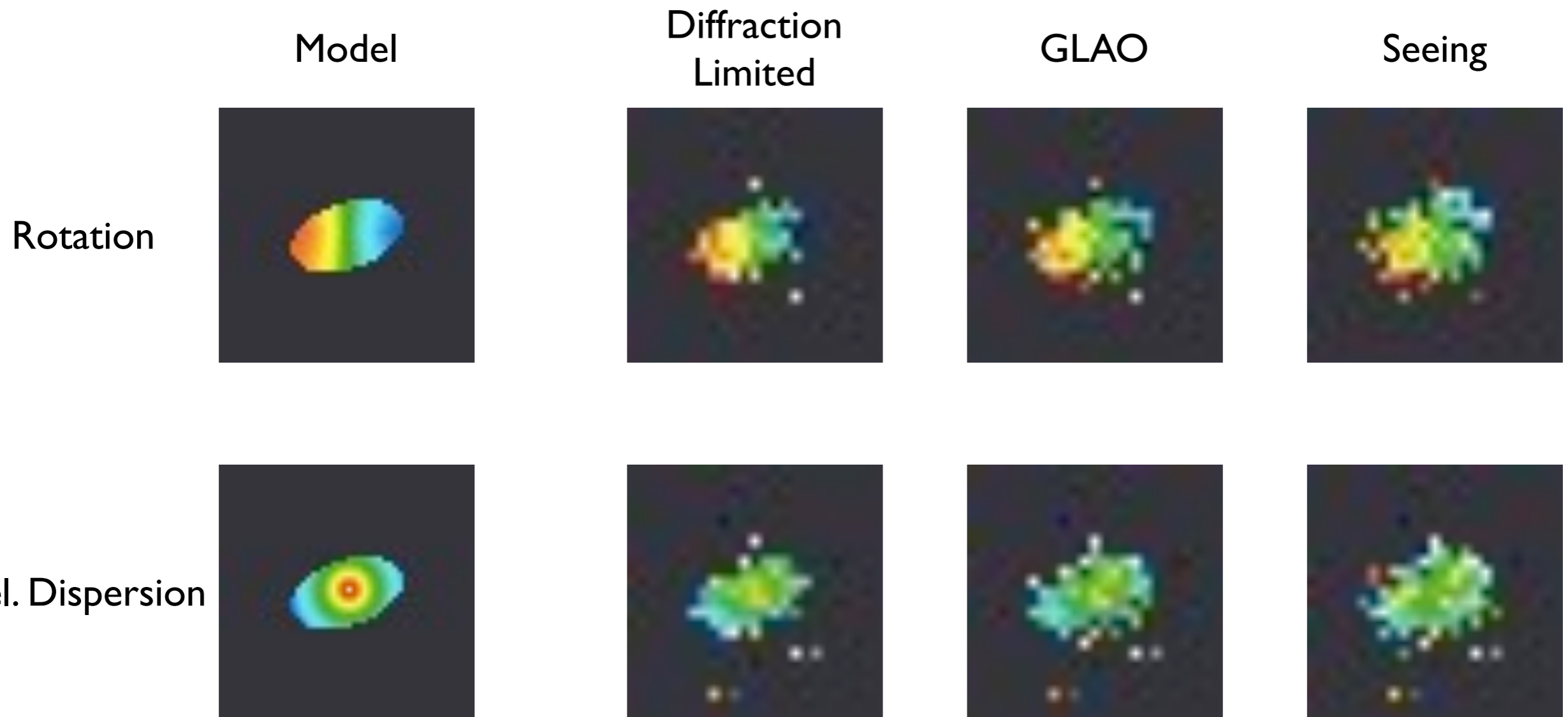
1200s x 9
0.12" Sampling

0



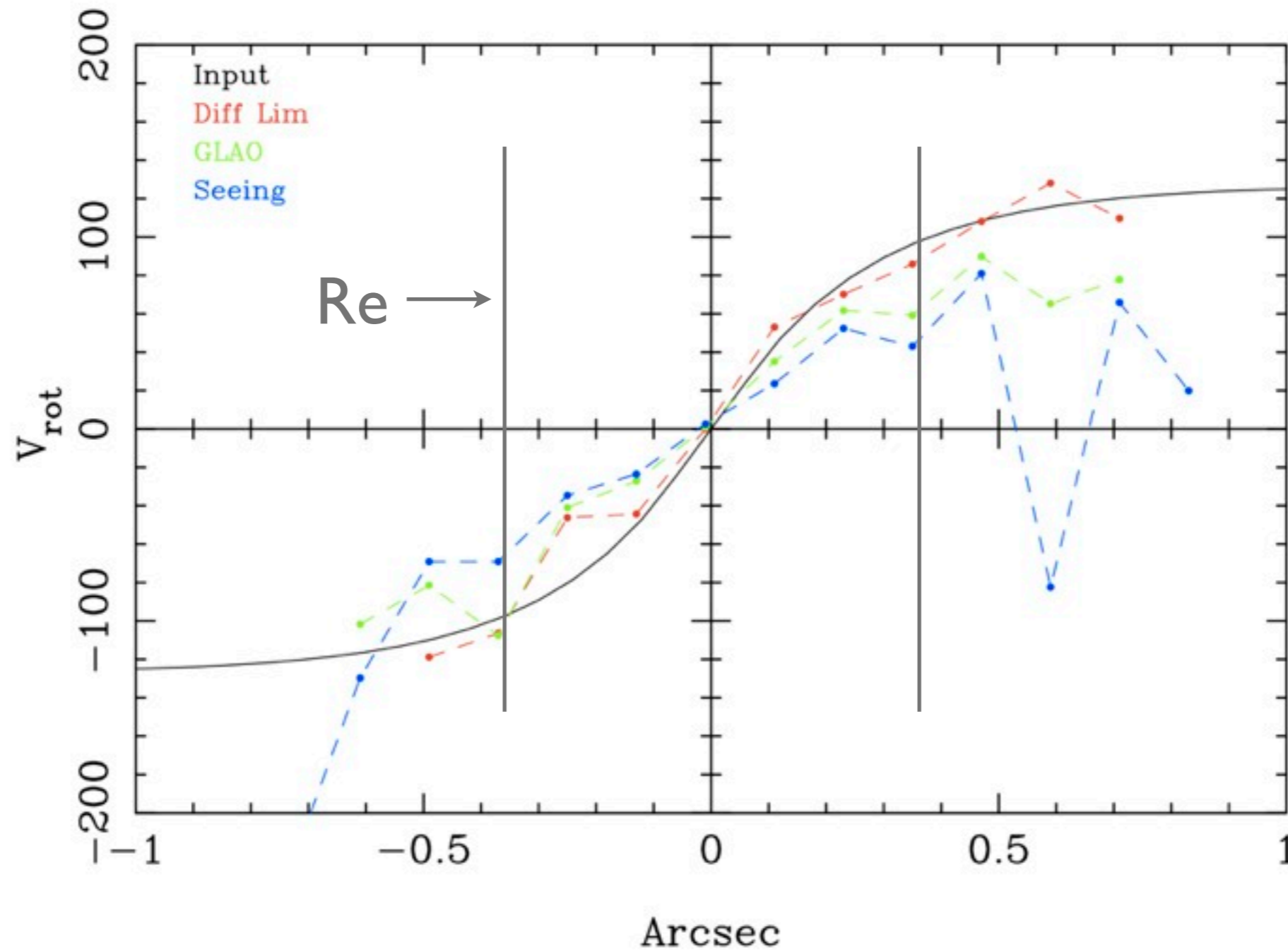
50

sBzK (2) K(AB)=22.75: H α Kinematics



sBzK (2) K(AB)=22.75: Rotation Curve

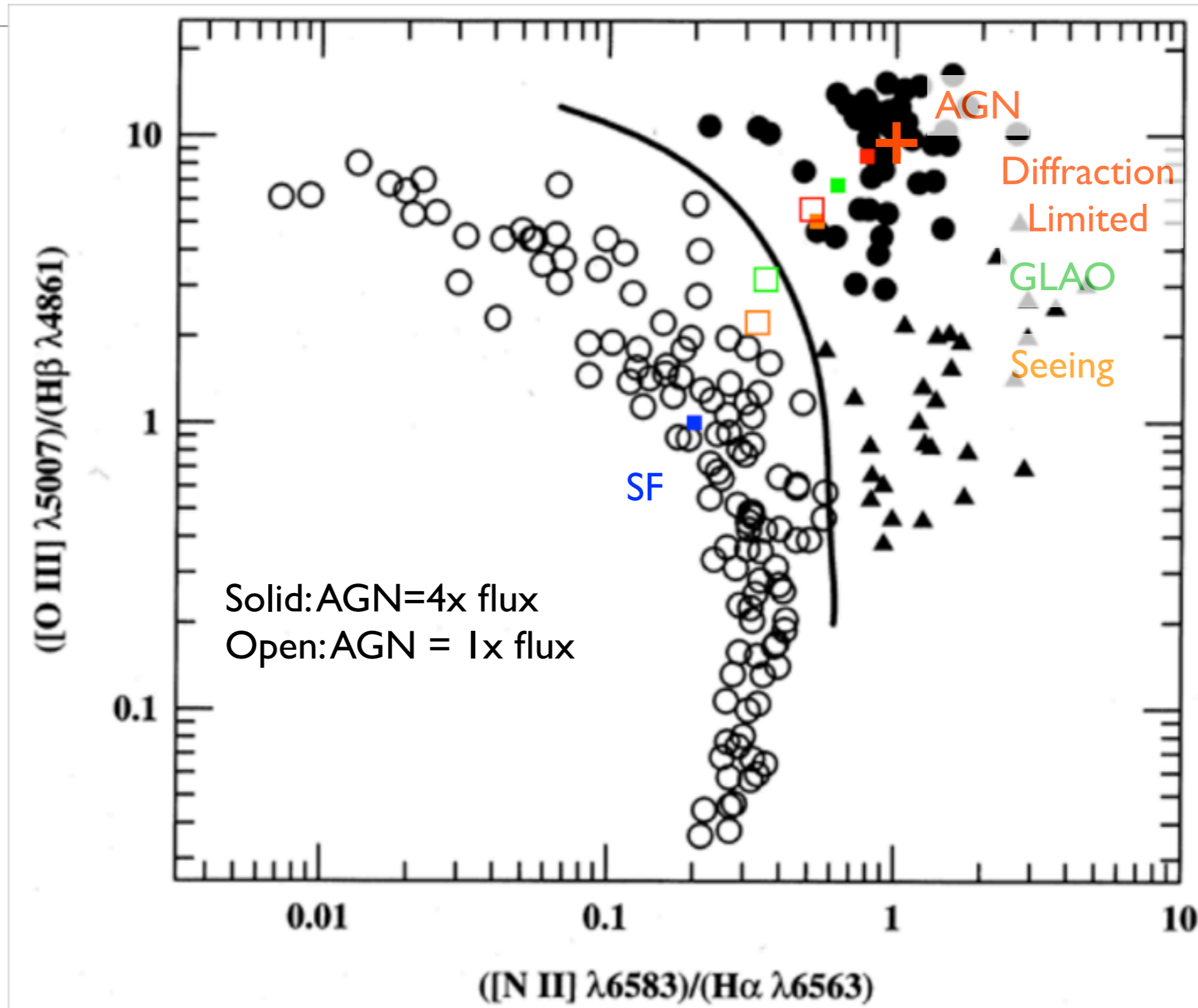
31682 (K=22.75AB)



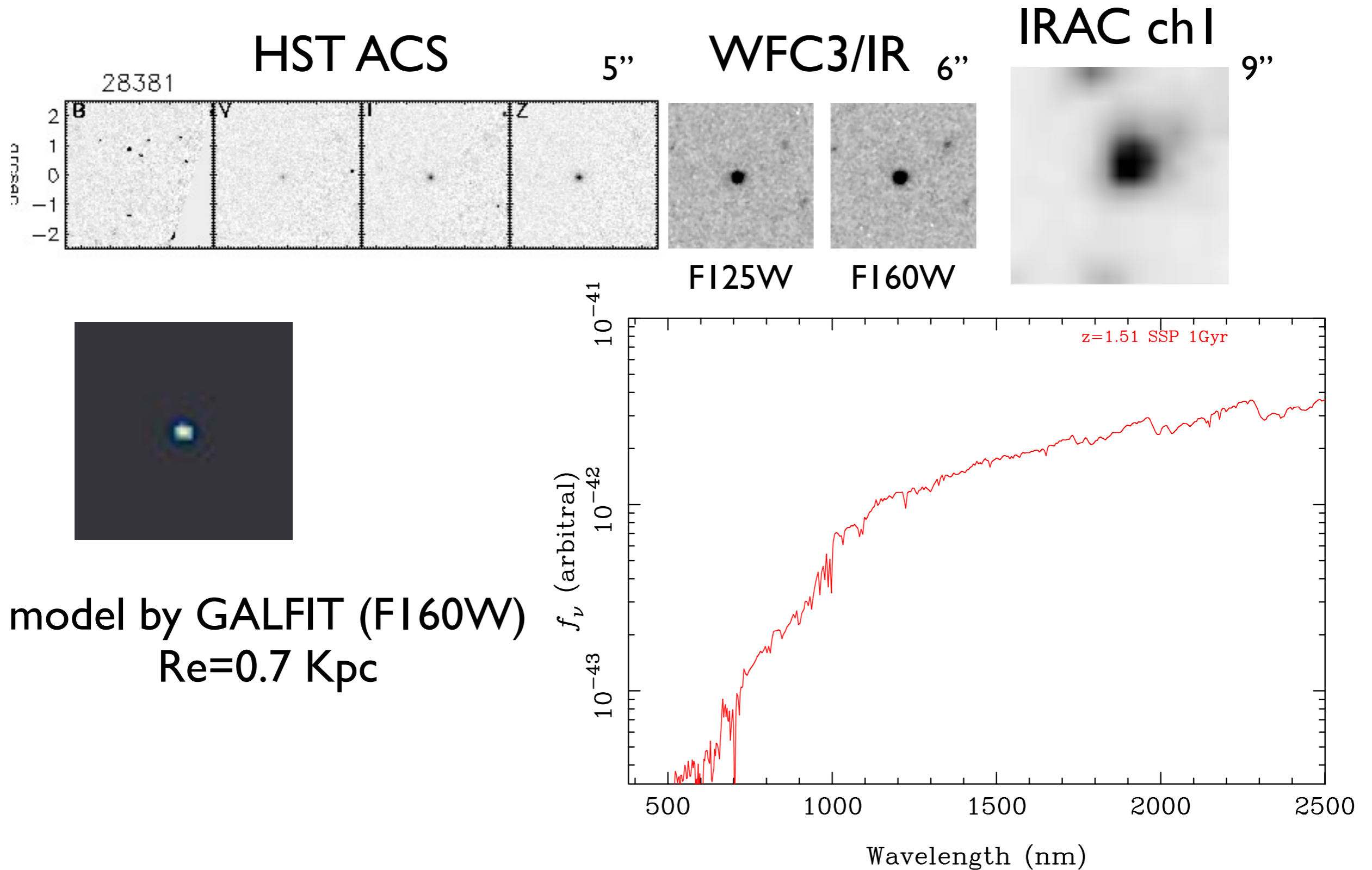
Finding AGN Component at the Center

- Flux Distribution: $z=2.3$ sBzK
- Input AGN Spectrum at the Central Pixel (0.06")
- Other Parts: Spectrum of Star-Forming Region
- Observe with 0.12"/pixel Sampling IFS

BPT Diagram

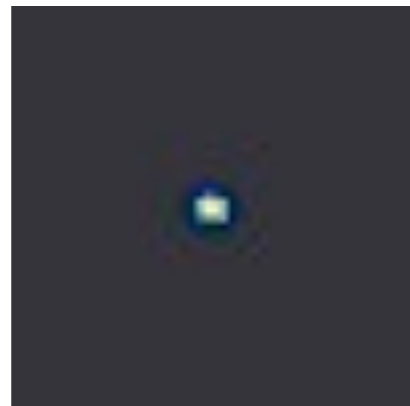


ρBzK : $K(\text{AB})=22.75$ $z_{\text{phot}}=1.51$



ρ_{BzK} : $K(AB)=22.75$ $z_{\text{phot}}=1.51$

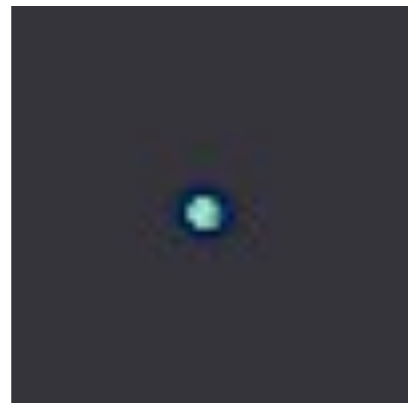
Model



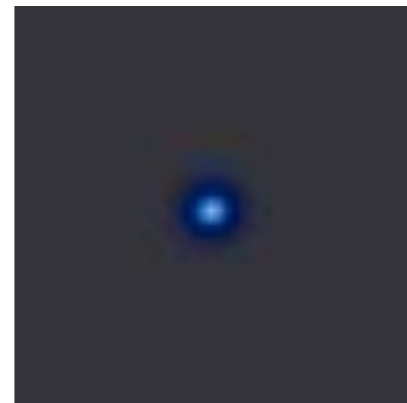
Flux

3" x 3"

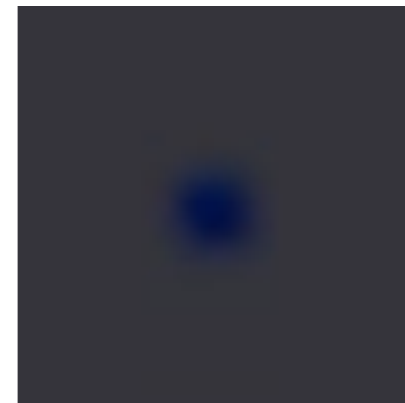
Input



Diffraction
Limited



GLAO



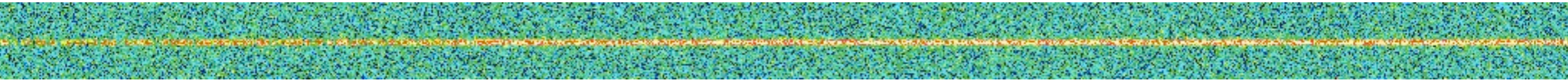
Seeing

Condition="moderate"

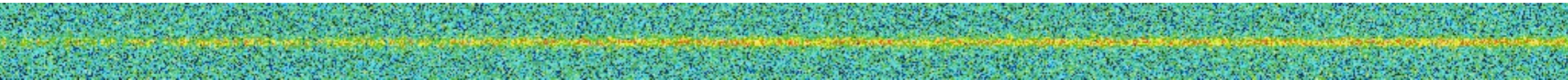
$\rho\text{BzK: } K(\text{AB})=22.75 \quad z_{\text{phot}}=1.51$

1,200 sec x 9, R~3,500, 0.4" Slit

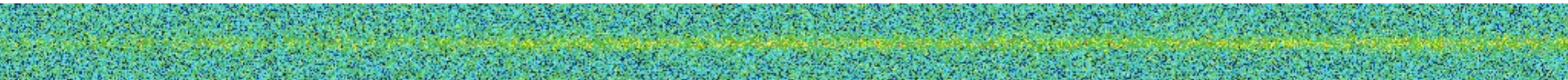
Diffraction
Limited



GLAO

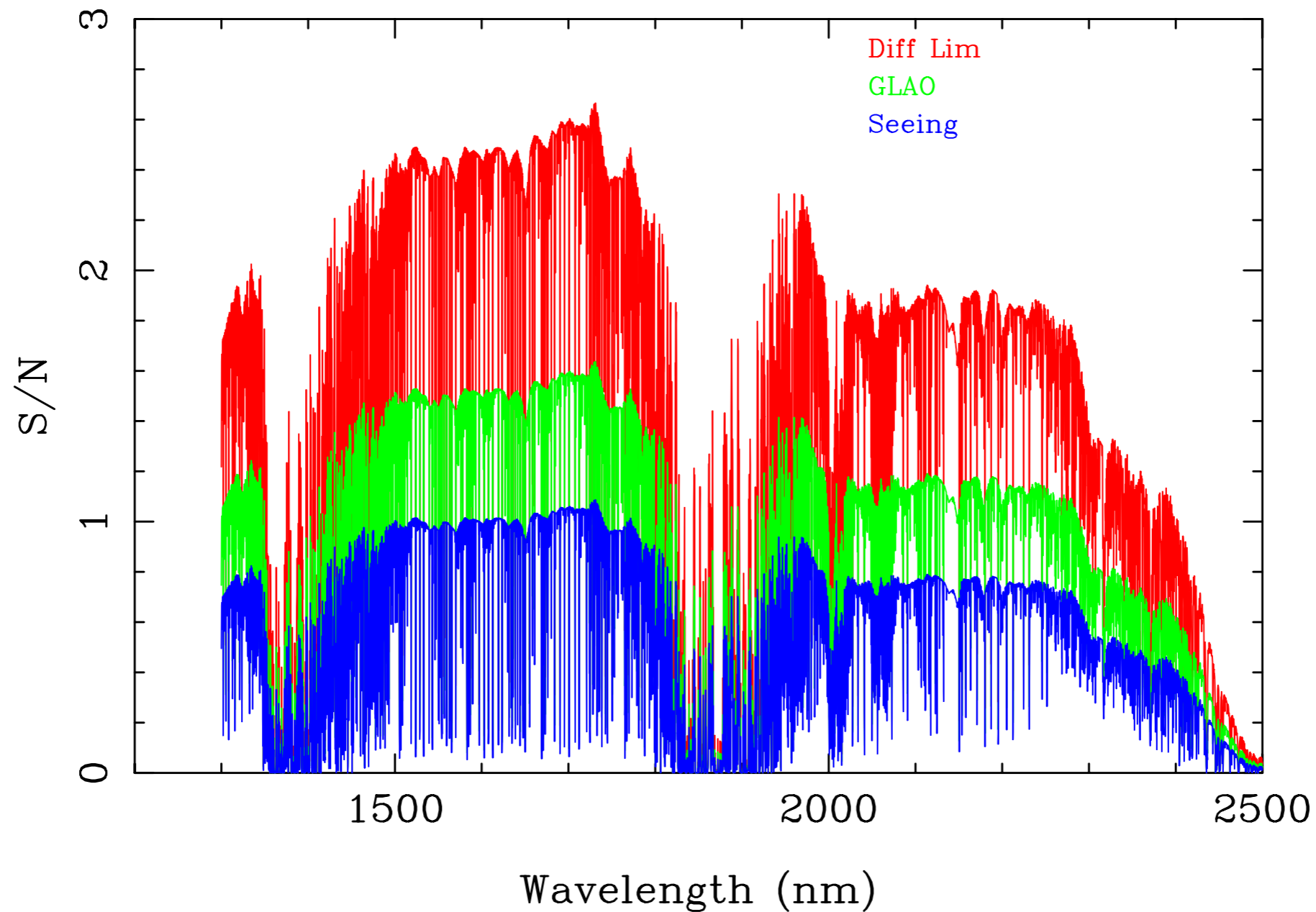


Seeing

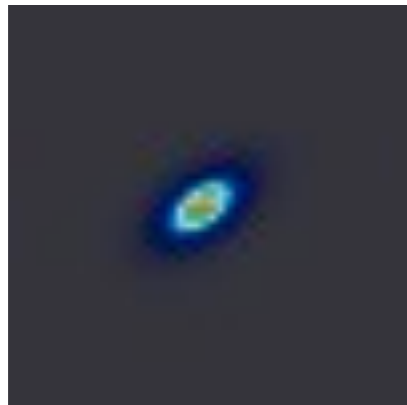
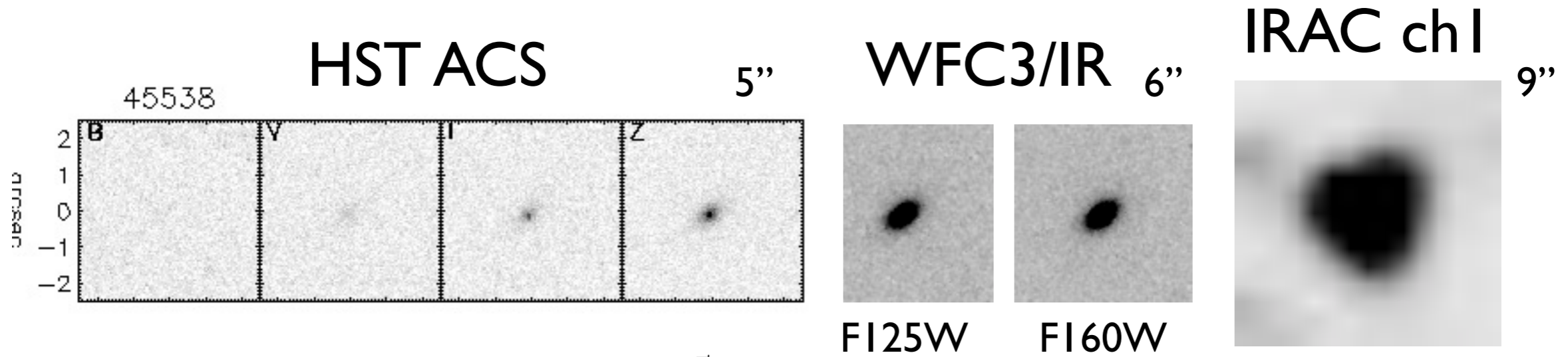


ρ_{BzK} : $K(AB)=22.75$ $z_{\text{phot}}=1.51$

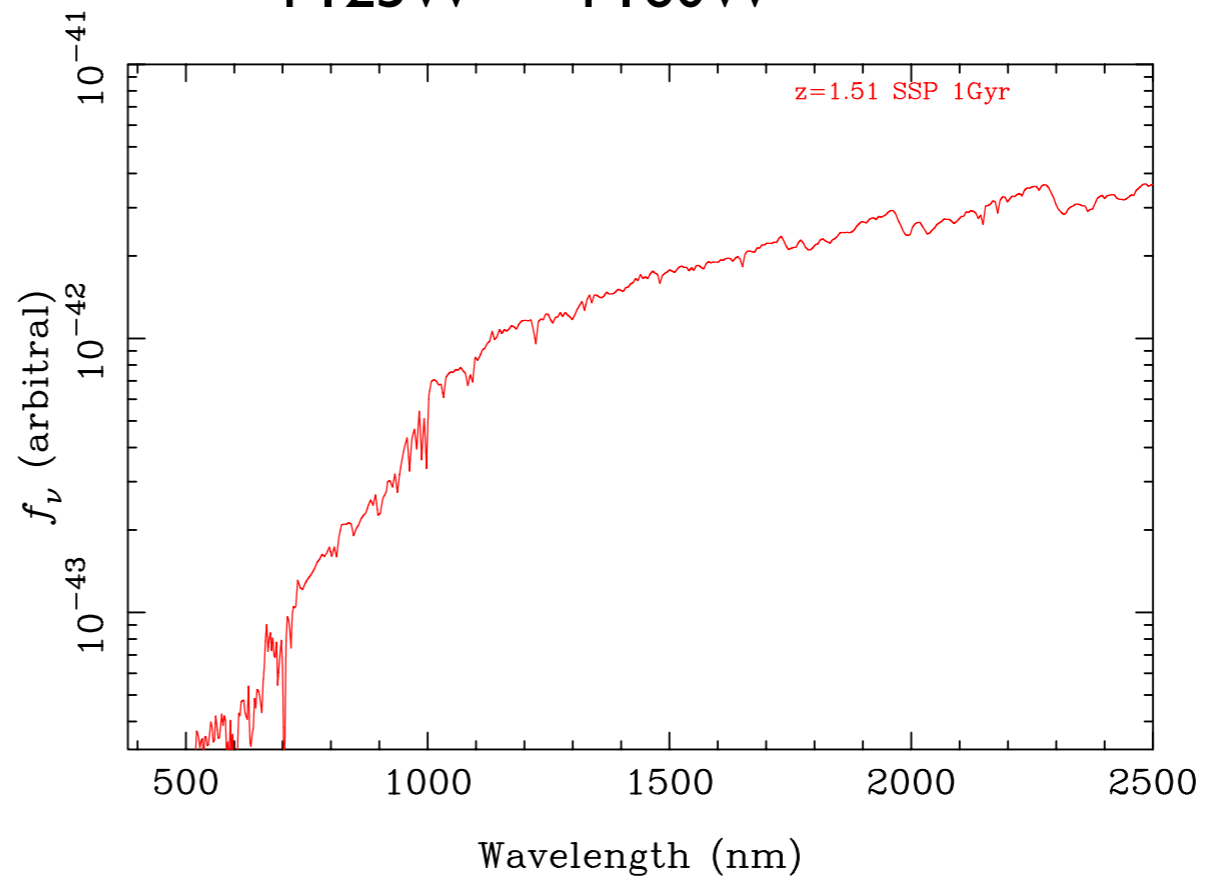
1,200 sec x 9, $R \sim 3,500$, 0.4" Slit



pBzK: $K(AB)=21.08$ $z_{\text{phot}}=1.61$

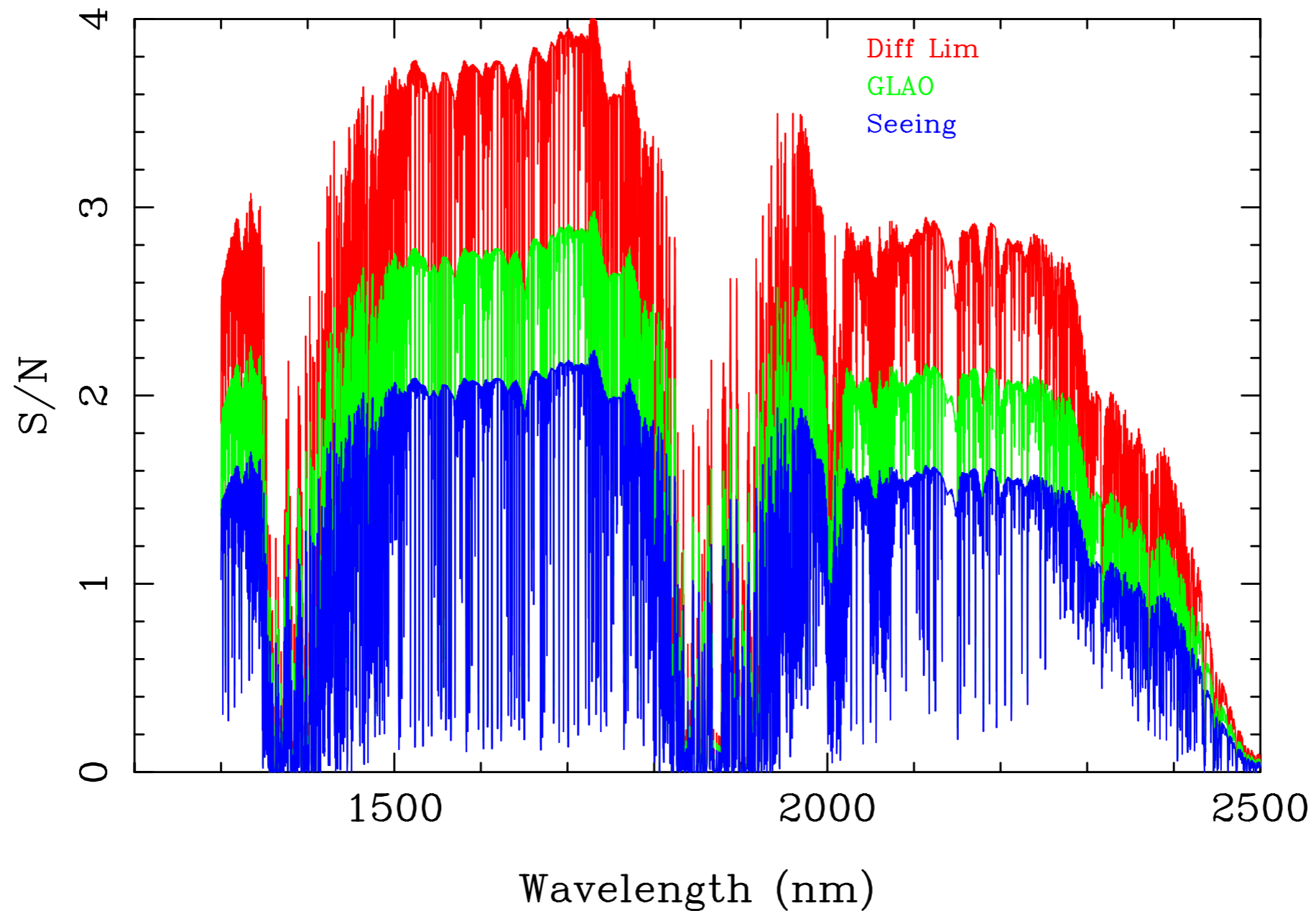


model by GALFIT (F160W)
Re=2.5 Kpc



$\rho_{\text{BzK}}: K(\text{AB})=21.08 \quad z_{\text{spec}}=1.61$

1,200 sec x 9, R~3,500, 0.4" Slit



分光シミュレーション

- スリット分光: GLAOはNatural Seeingでの観測と比べると最大約2倍のS/N
- $z \sim 2$ sBzKの面分光による力学構造の調査
 - 回折限界では $K=23AB$ 程度の暗い銀河でも可能
 - GLAOでは明るいものに限られるか
 - モデル化して空間的なdilutionの影響を評価する必要
- 中心部のAGN成分の検出
 - 回折限界では中心に集中したAGNを検出可能
 - Seeing Limitedでは周囲の星形成に埋もれてしまう
 - GLAOでも影響を受けるがSeeing Limitedよりは軽減

GLAOで銀河進化を調べる

- 既存のAO Assisted IFS (SINFONI, OSIRIS)で明るい $z \sim 2$ 銀河の力学構造は調べられている
- 8m + GLAOでは暗い銀河の力学構造の探査は簡単ではない
- GLAOの観測のユニークネス：広視野多天体での観測
 - マルチスリットで多数の天体の中心部分を狙った分光 = MOIRCSの延長
 - GLAOに最適化したサンプリングでの複数天体面分光 = nuMOIRCS / SIRMOS
- 分光サーベイの例:
 - 23 AB - sBzK 100 ($z \sim 2$) sBzK 140 ($z \sim 1.6$) - 20h / FoV