Buracos Negros: Sementes ou Cemitérios de Galáxias?

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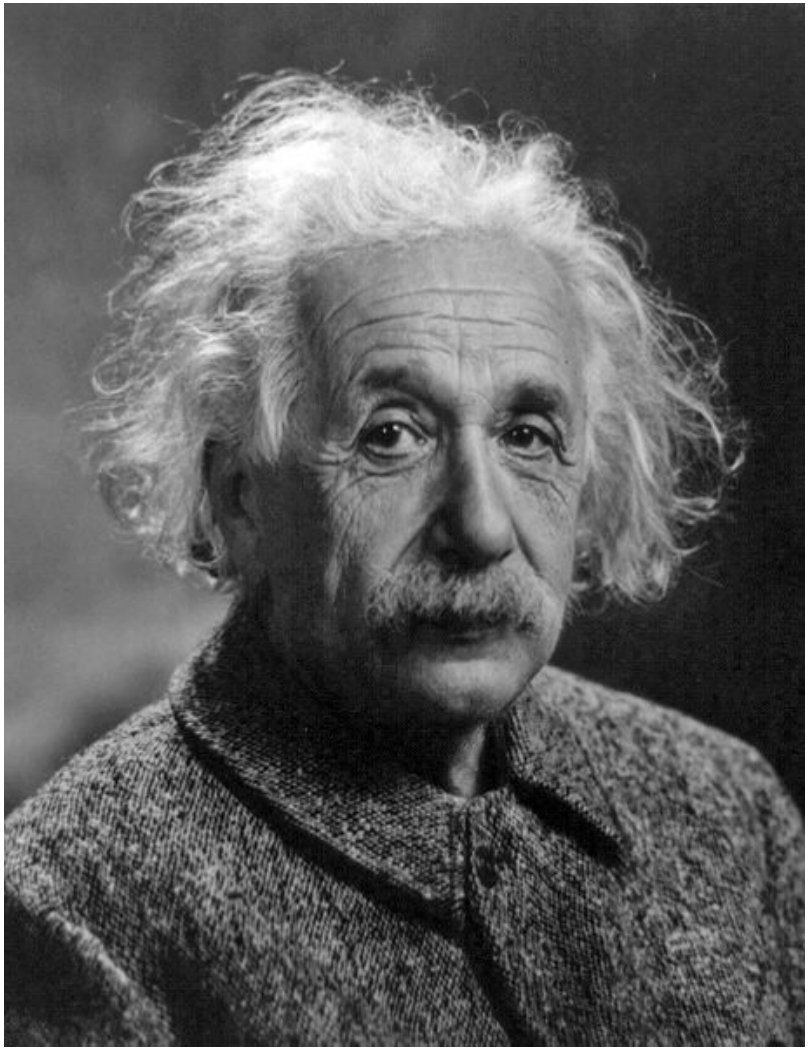
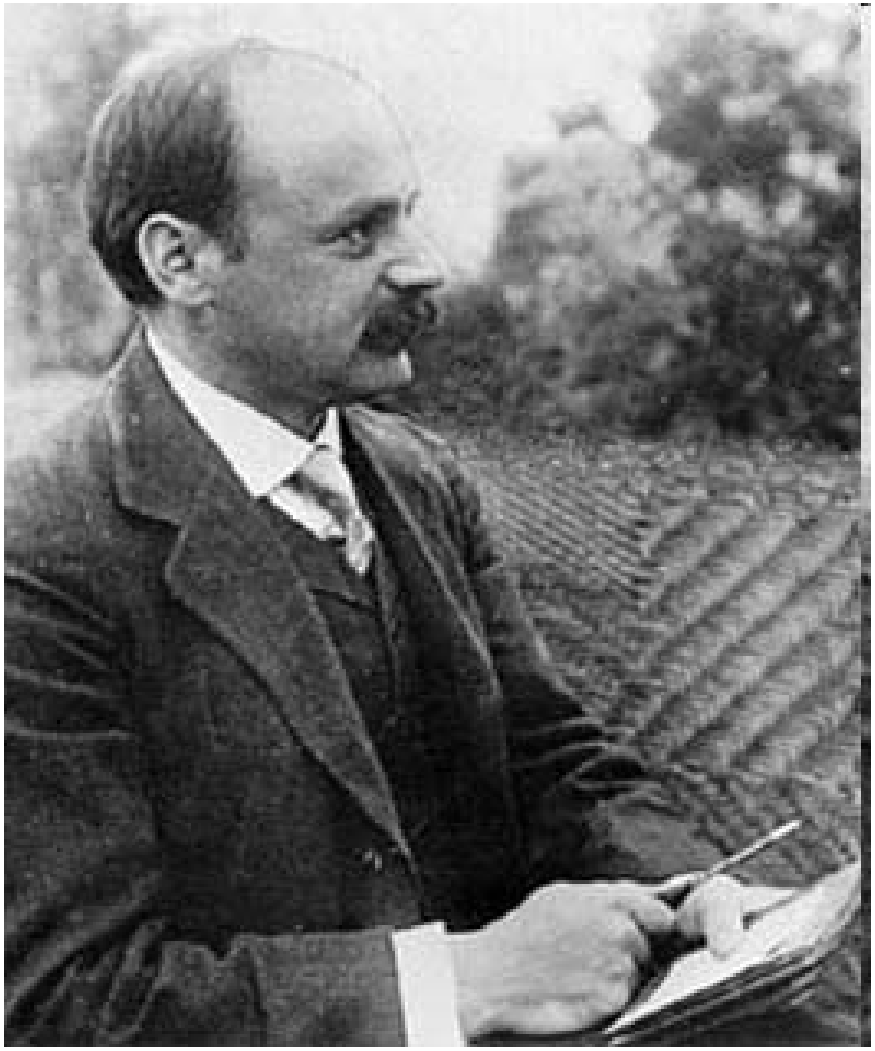
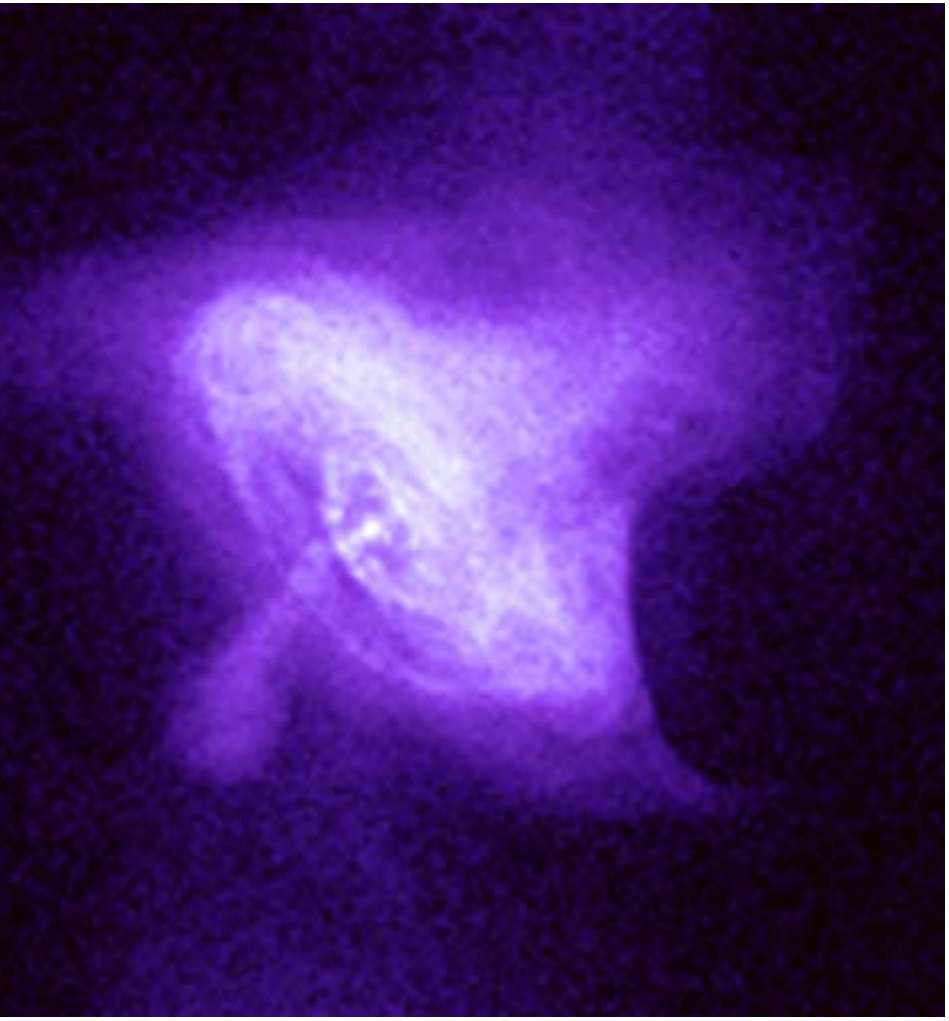
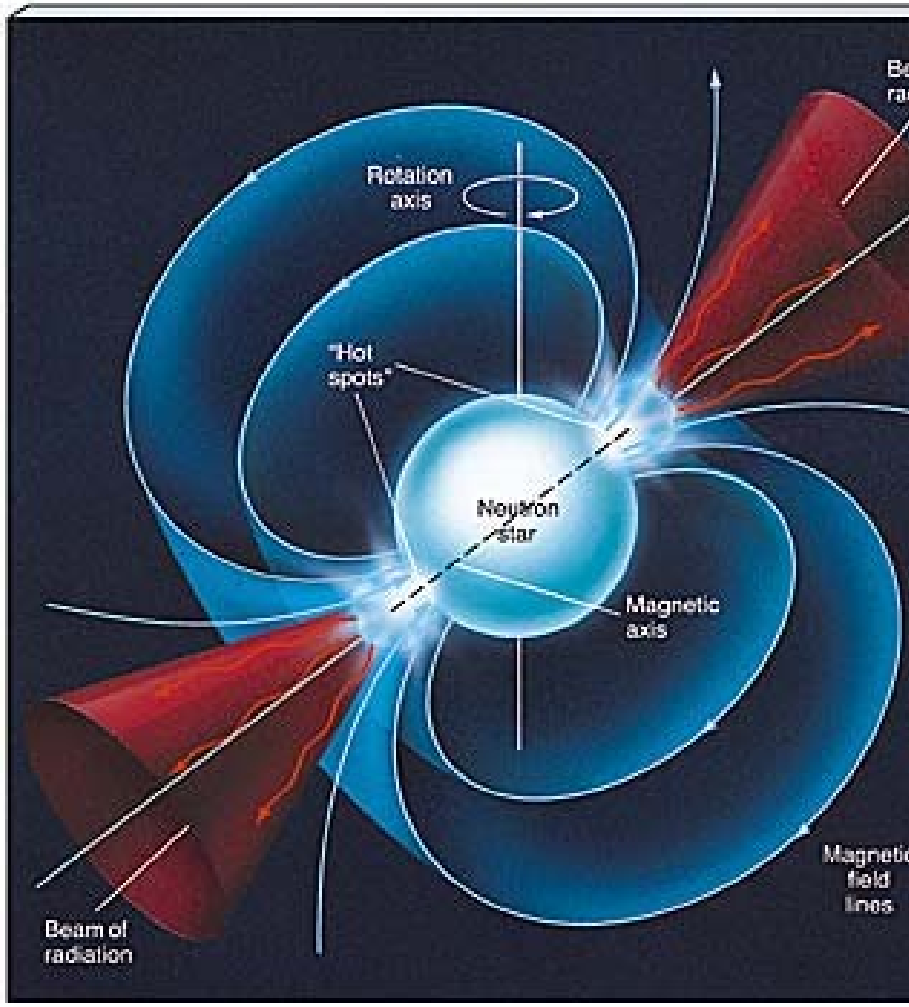
Albert Einstein (1879-1955)



Karl Schwarzschild (1873-1916)

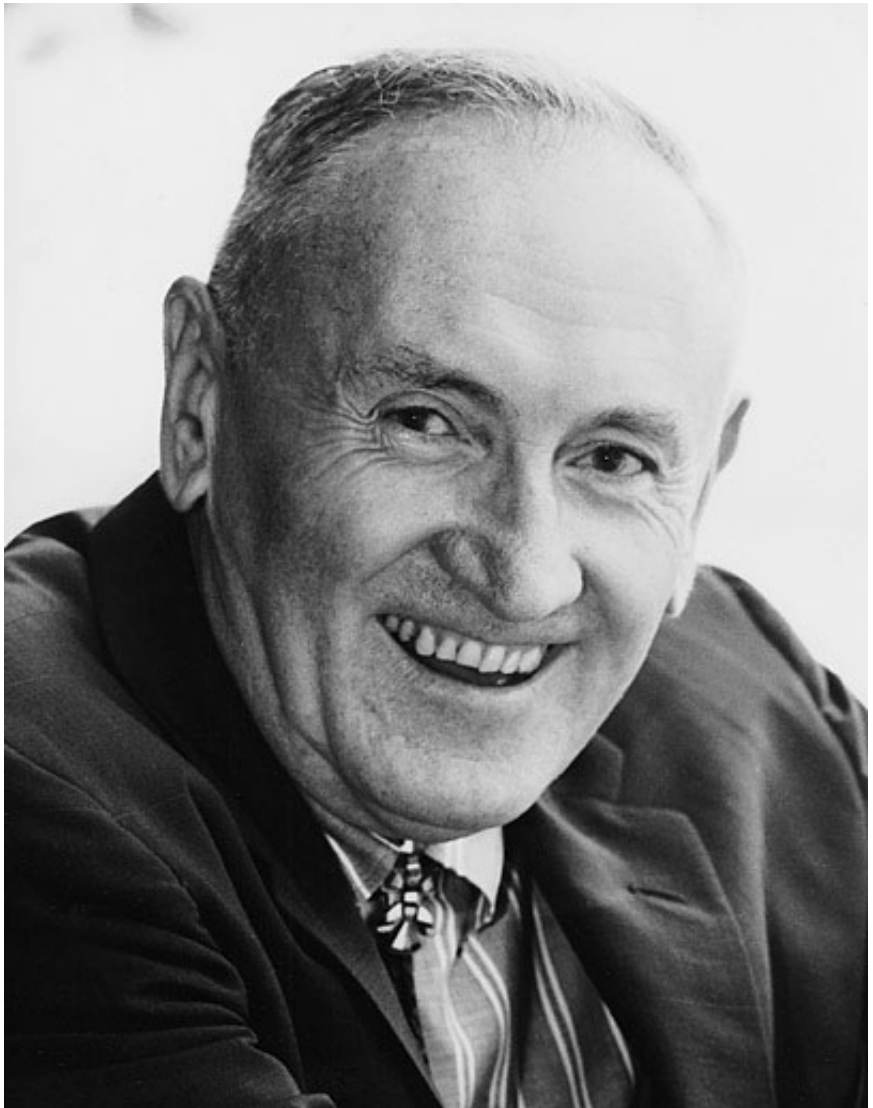


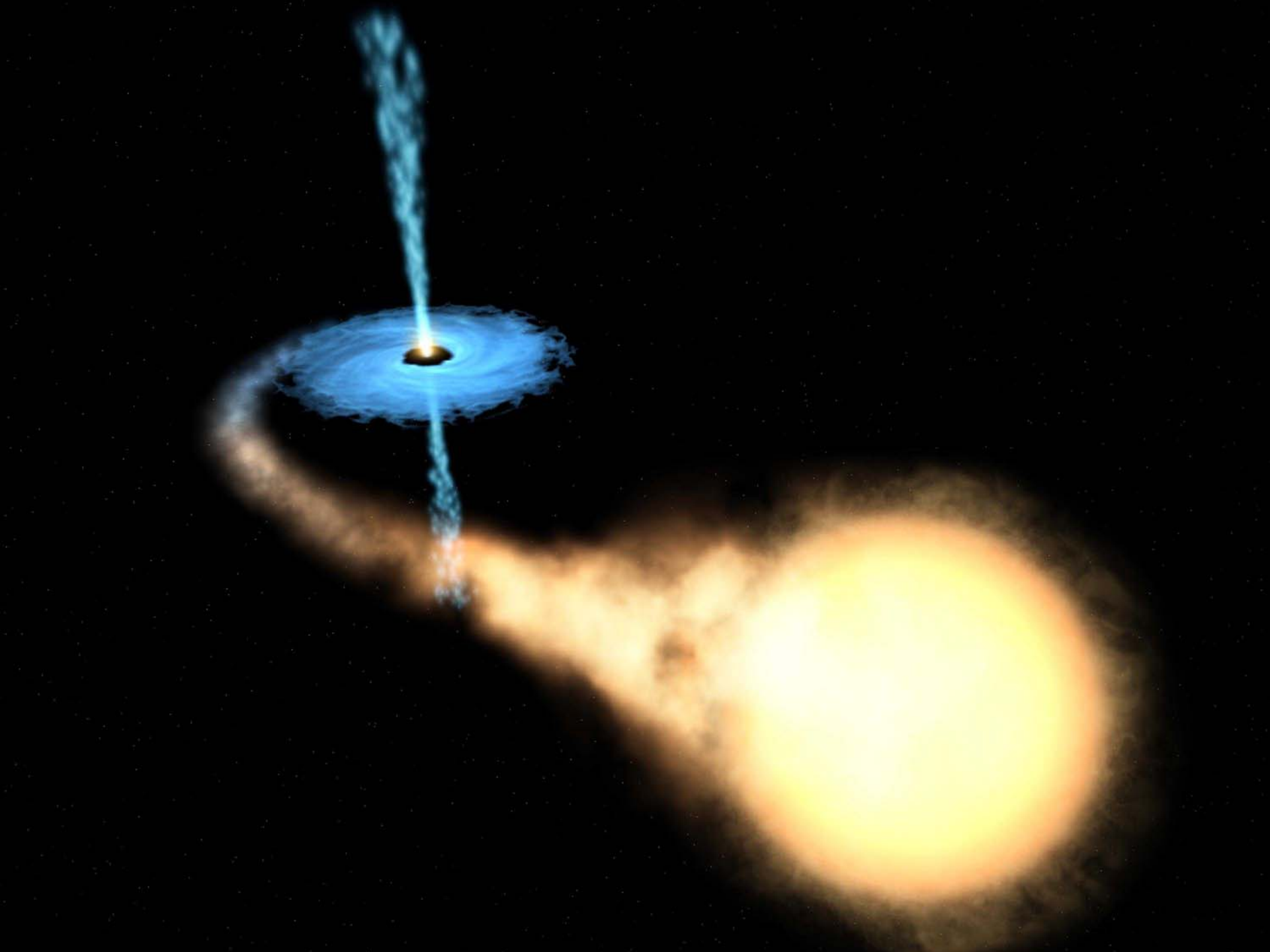


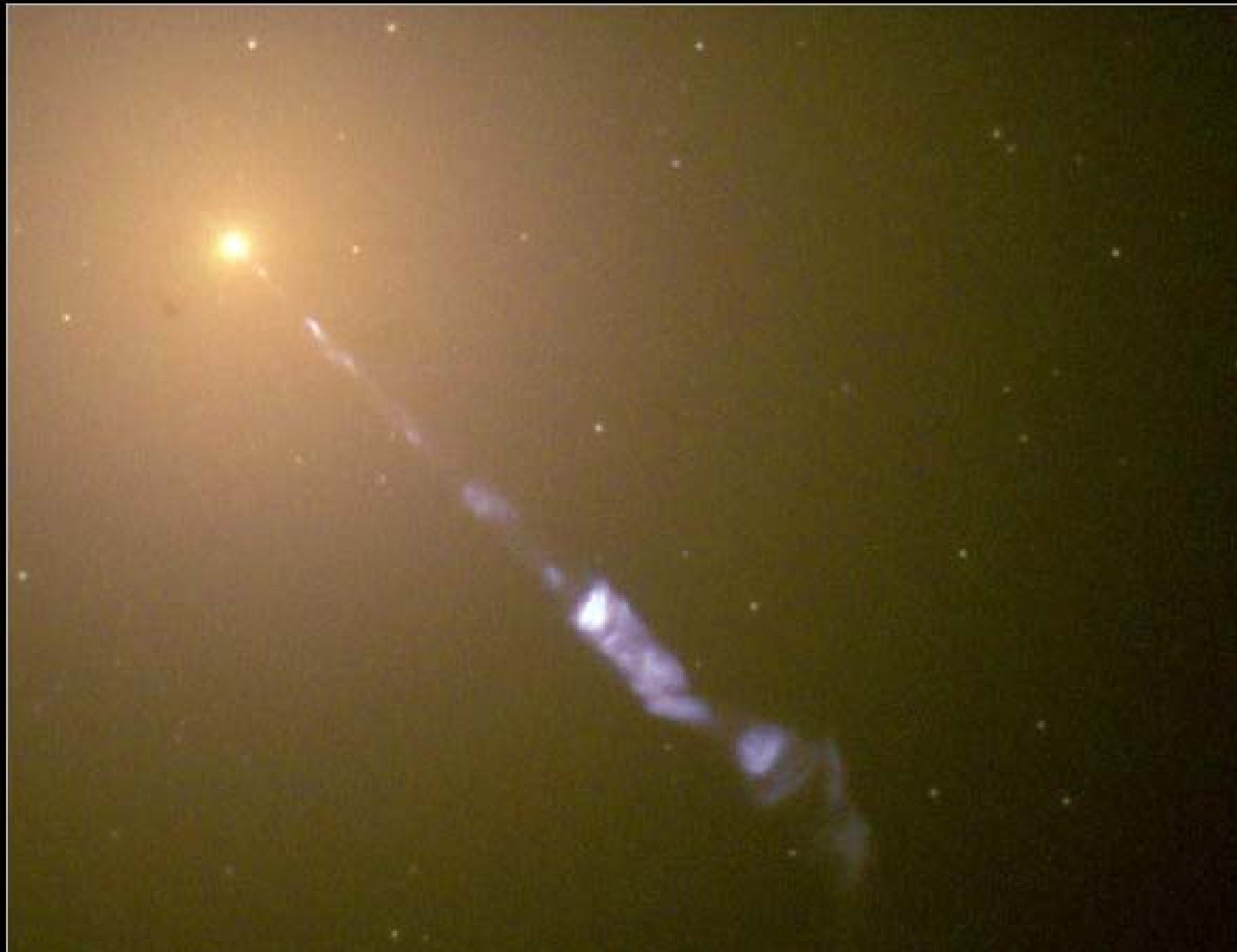

Rotation axis
"Hot spots"
Neutron star
Magnetic axis
Beam of radiation

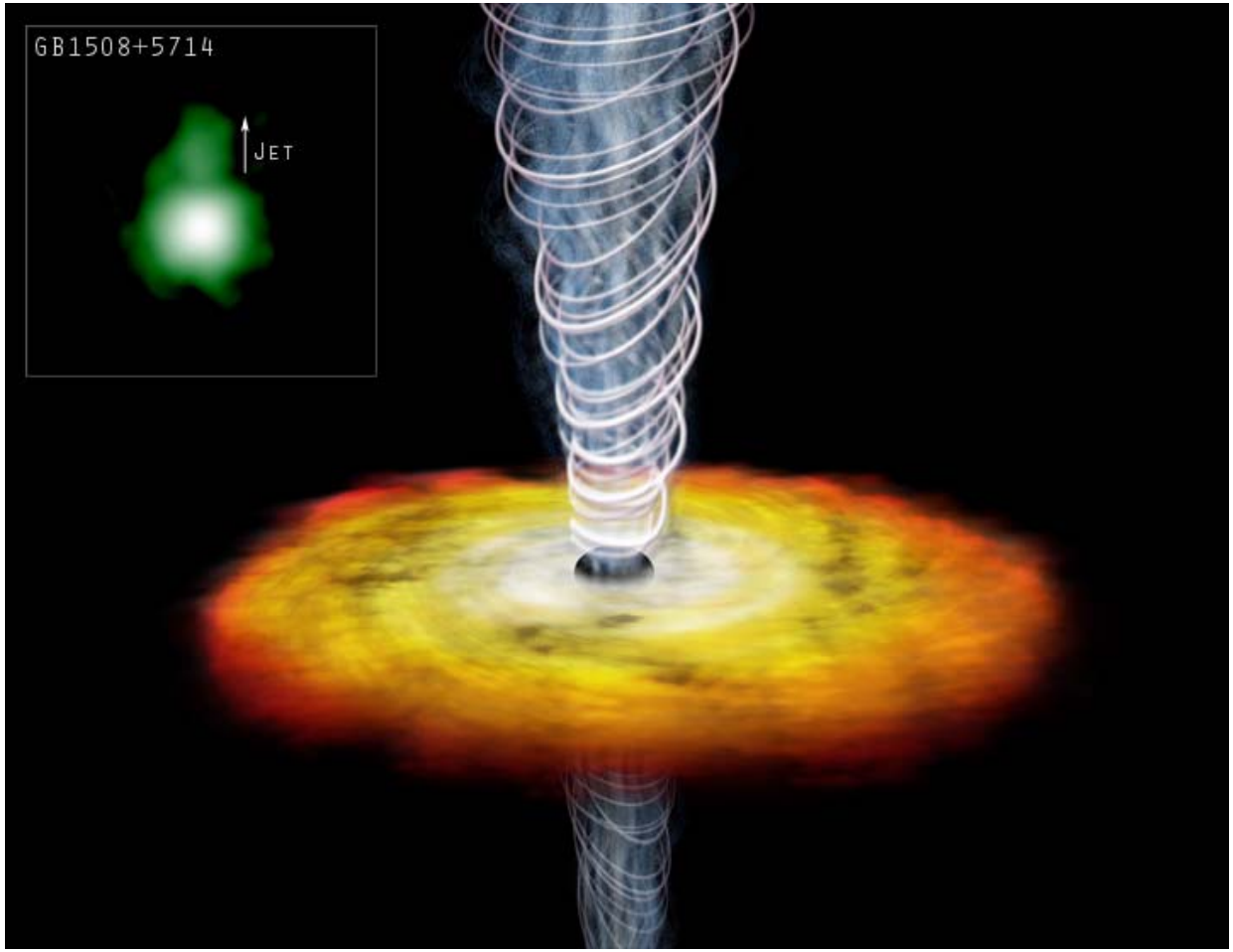
Subrahmanyan Chandrasekhar (1910-1995)

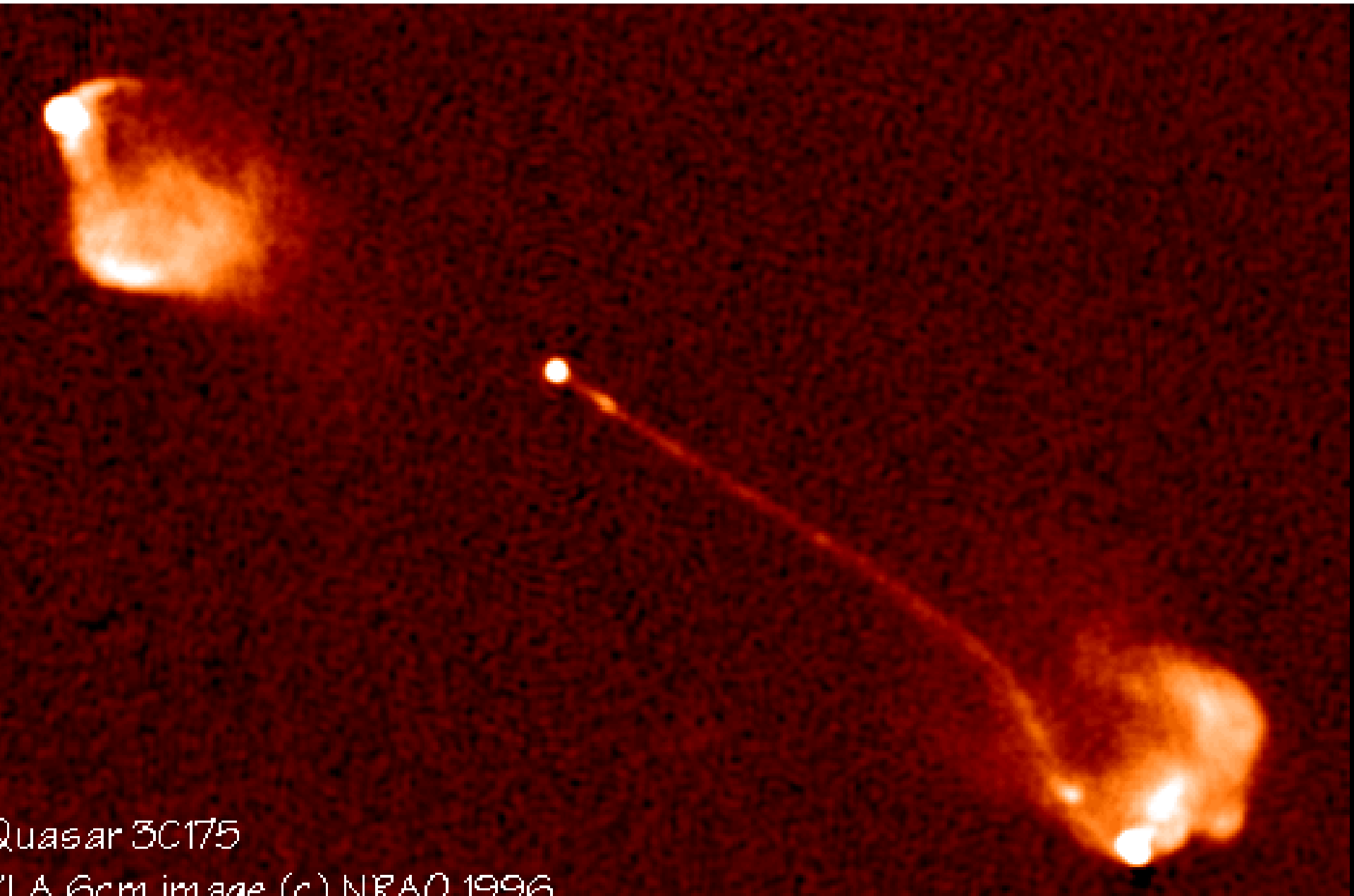
Fritz Zwicky (1898-1974)







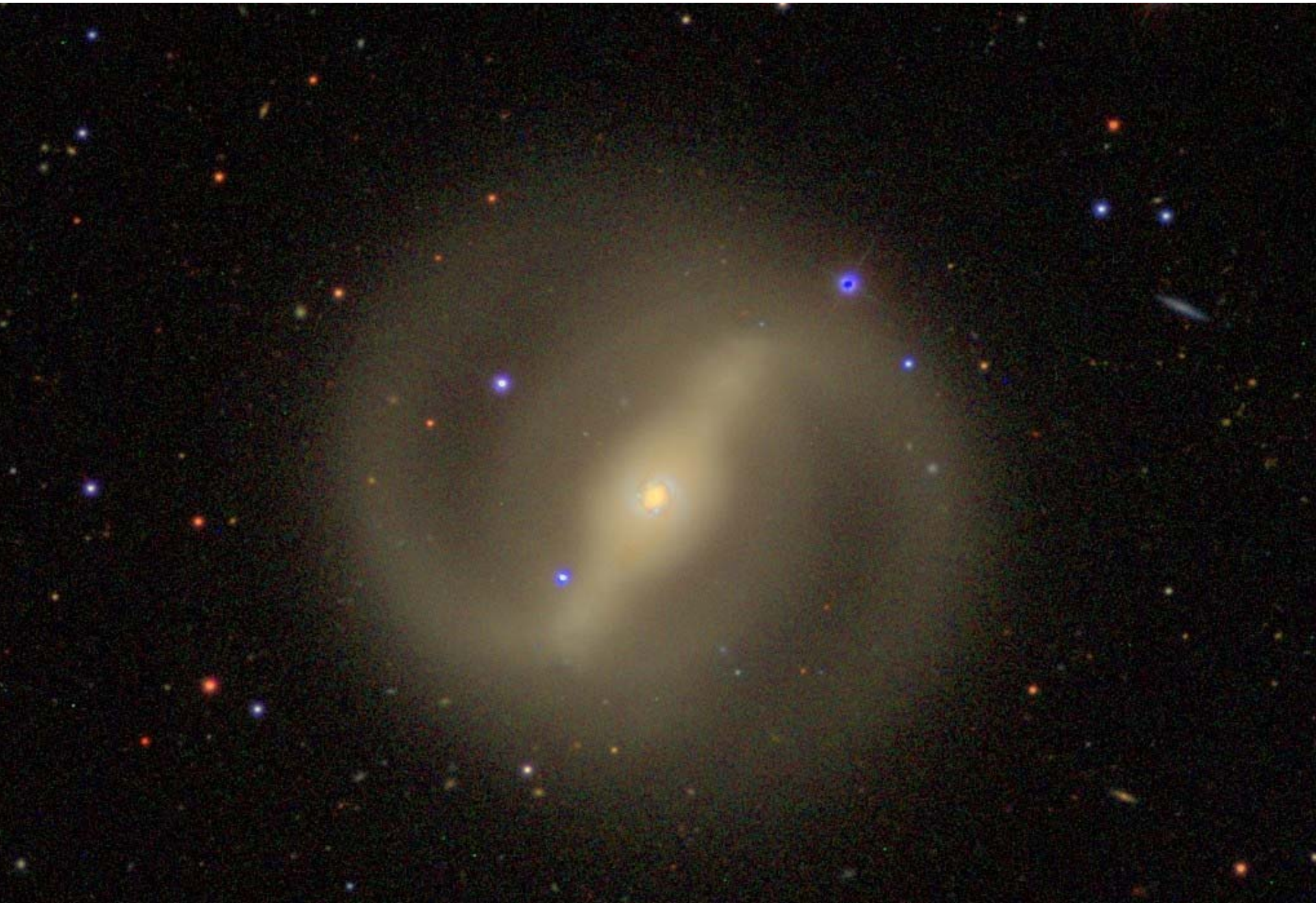

GB1508+5714
JET


Quasar 3C175
VLA 6cm image (c) NRAO 1996

NGC 3486 - LINER

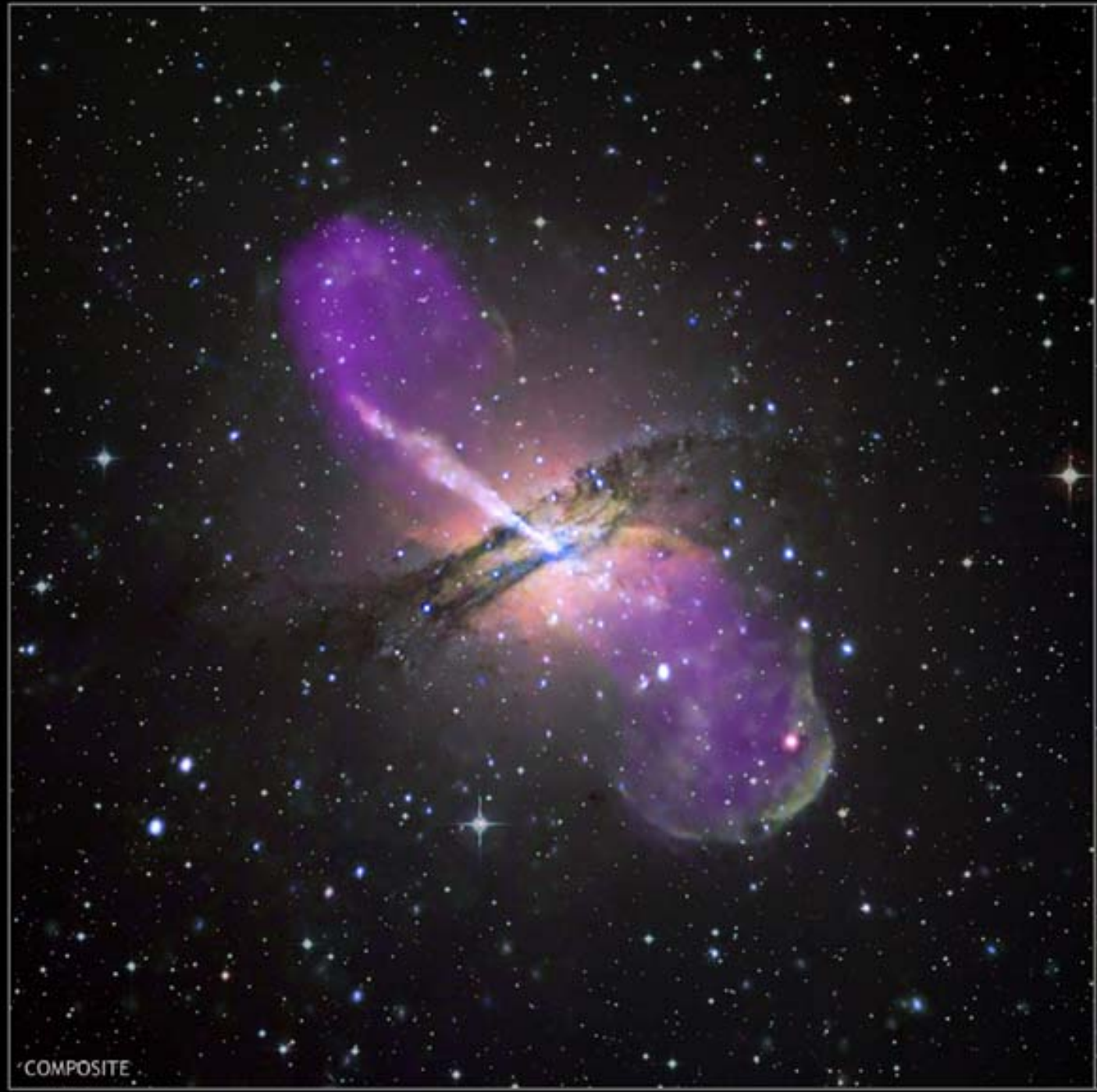
M 51 + M 51b (2 LINERs)

NGC 4314 – LINER (SDSS)



NGC 4565 – Sy1.9 (SDSS)

NGC 3718 - LINER (SDSS)

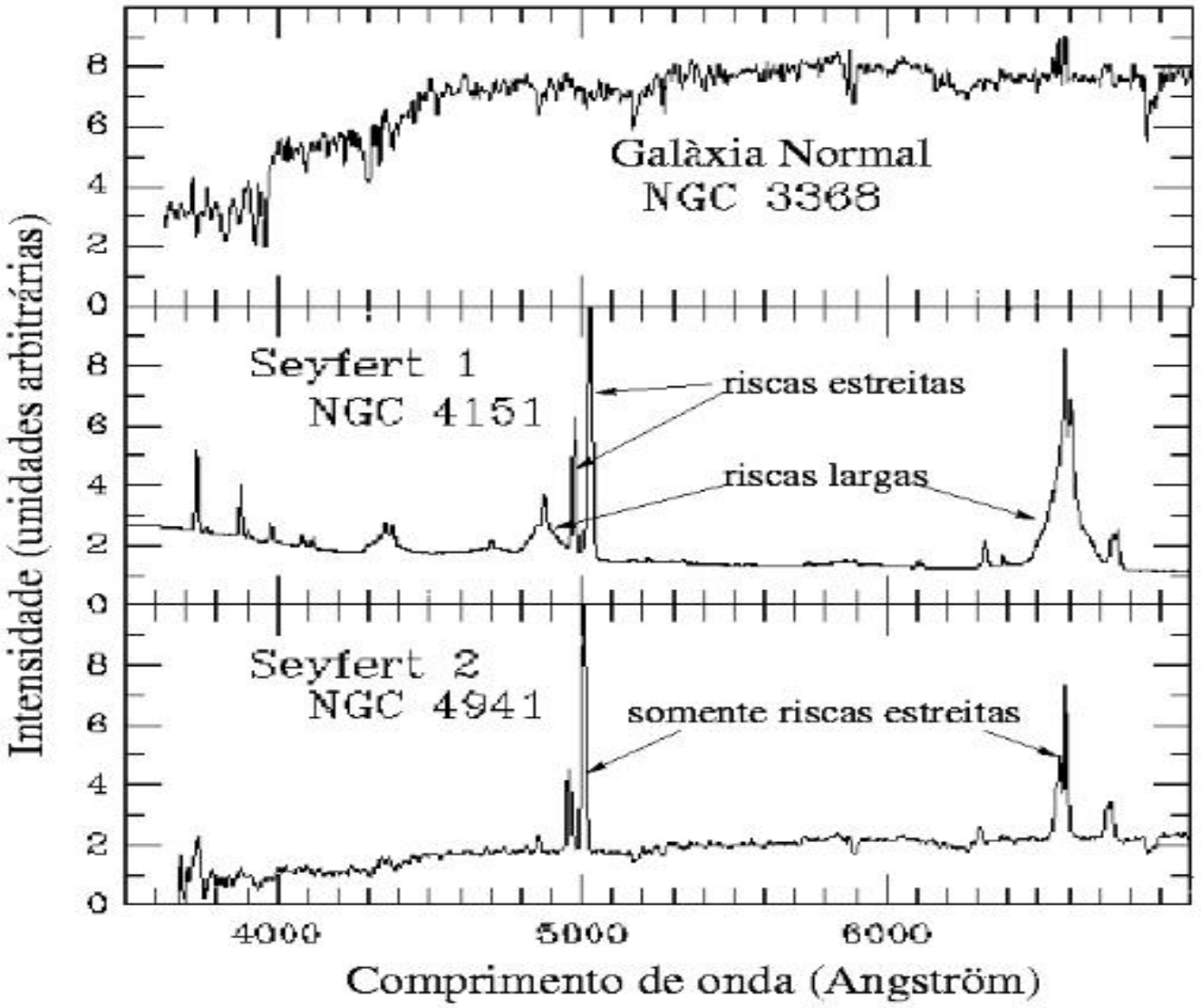

COMPOSITE


X-RAY

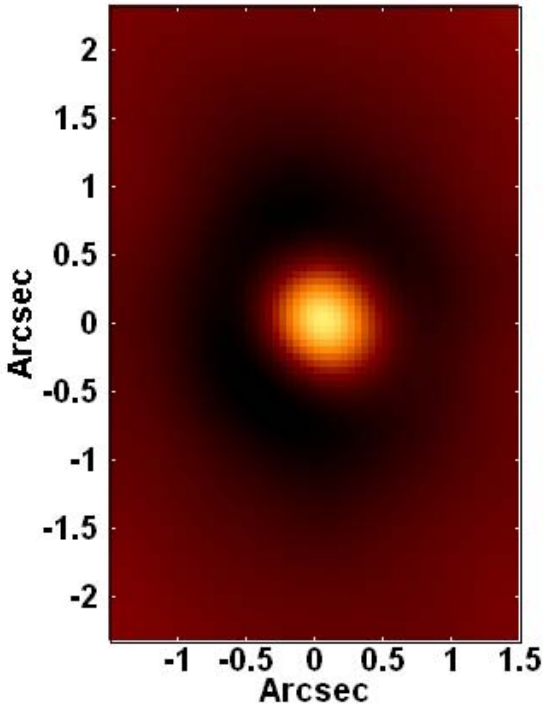

RADIO

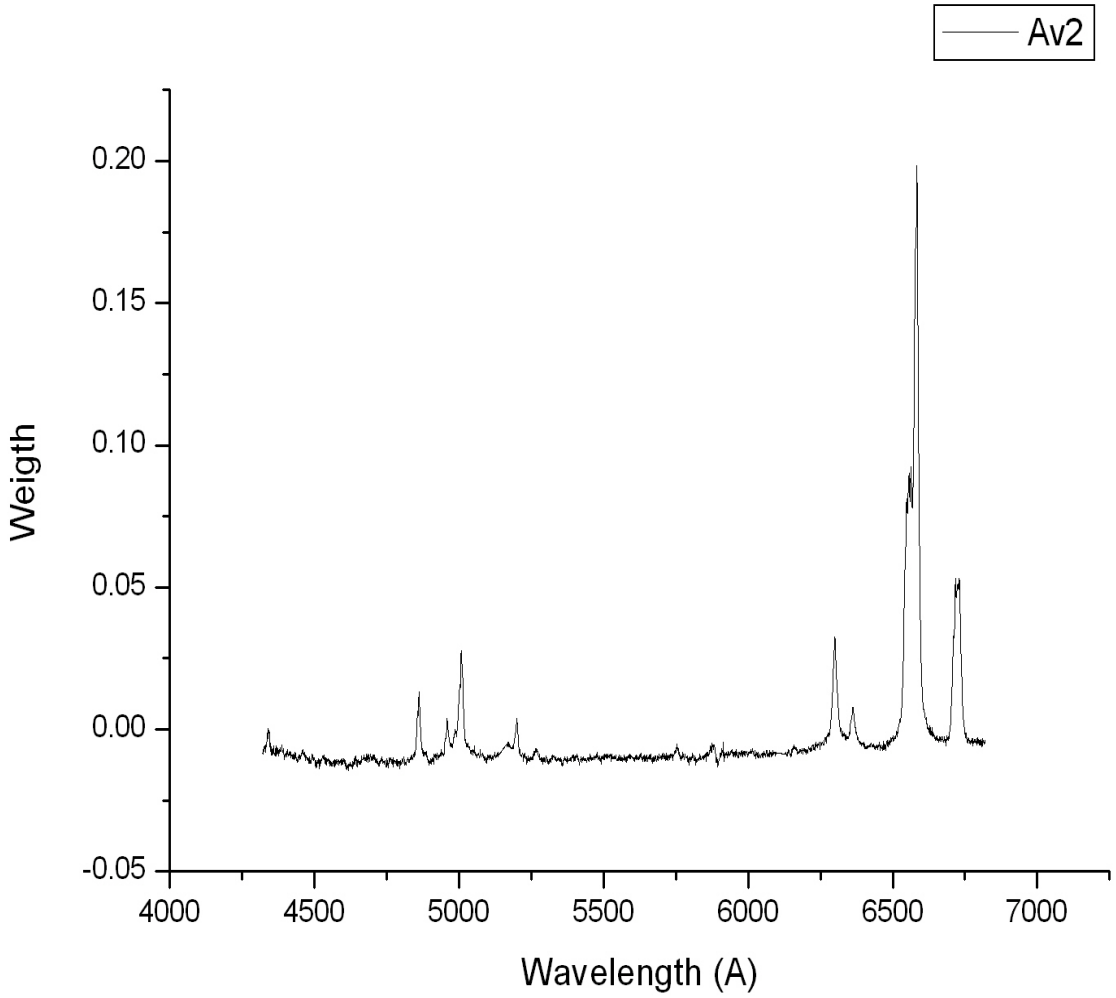

OPTICAL

Seyfert 1 vs 2

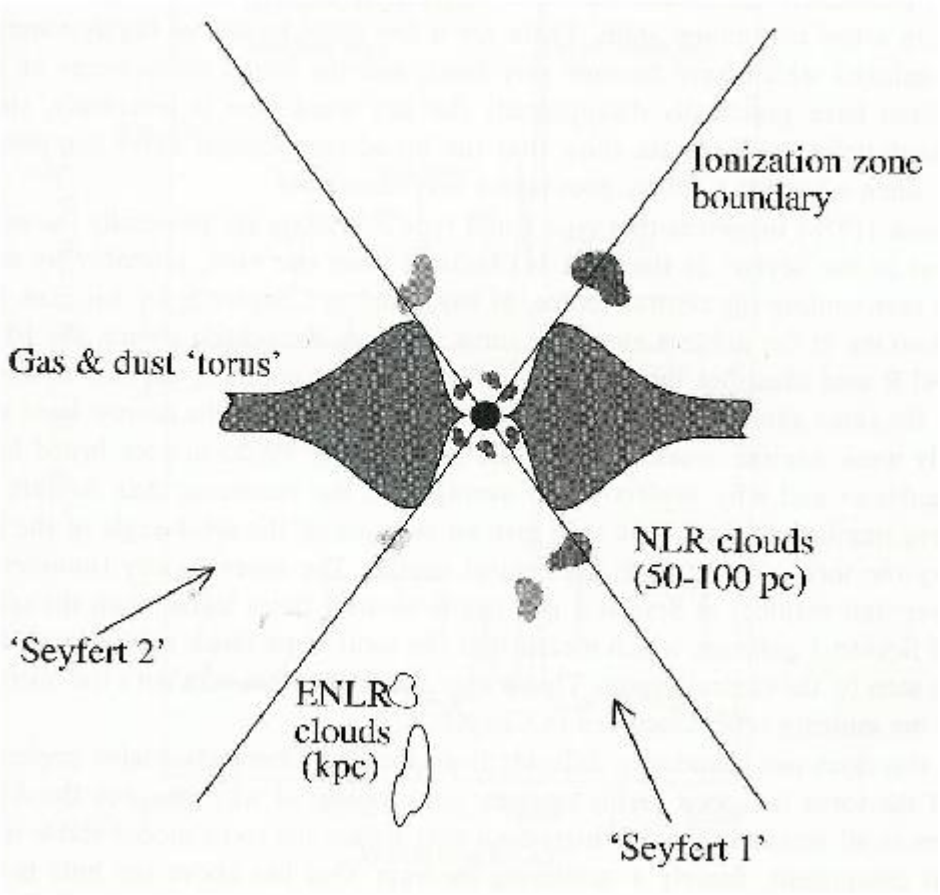


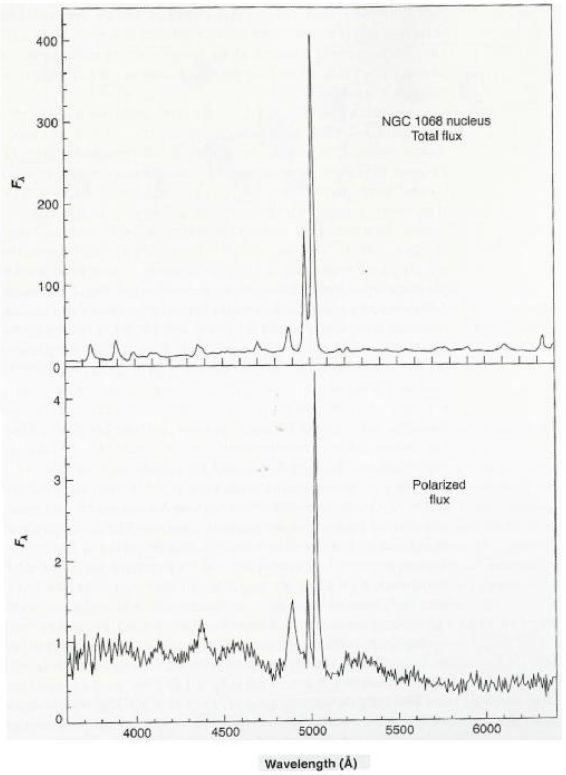
IC1459 – Av 2

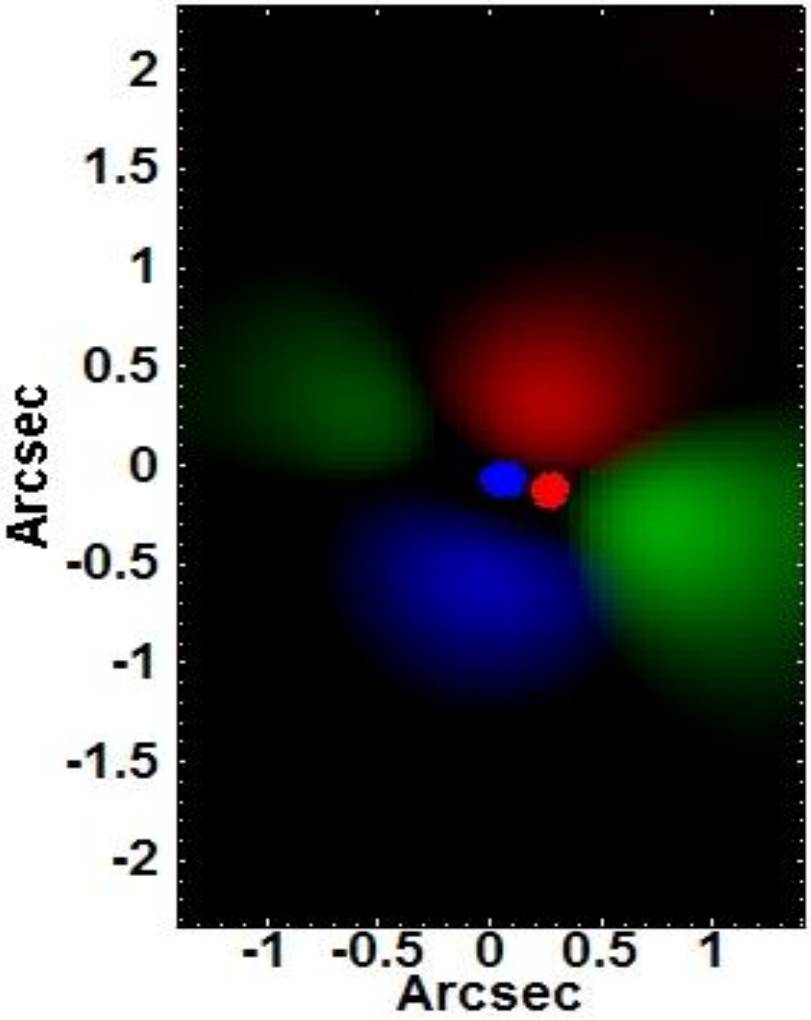

Arcsec
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-1
-0.5
0
0.5
1
1.5
Arcsec

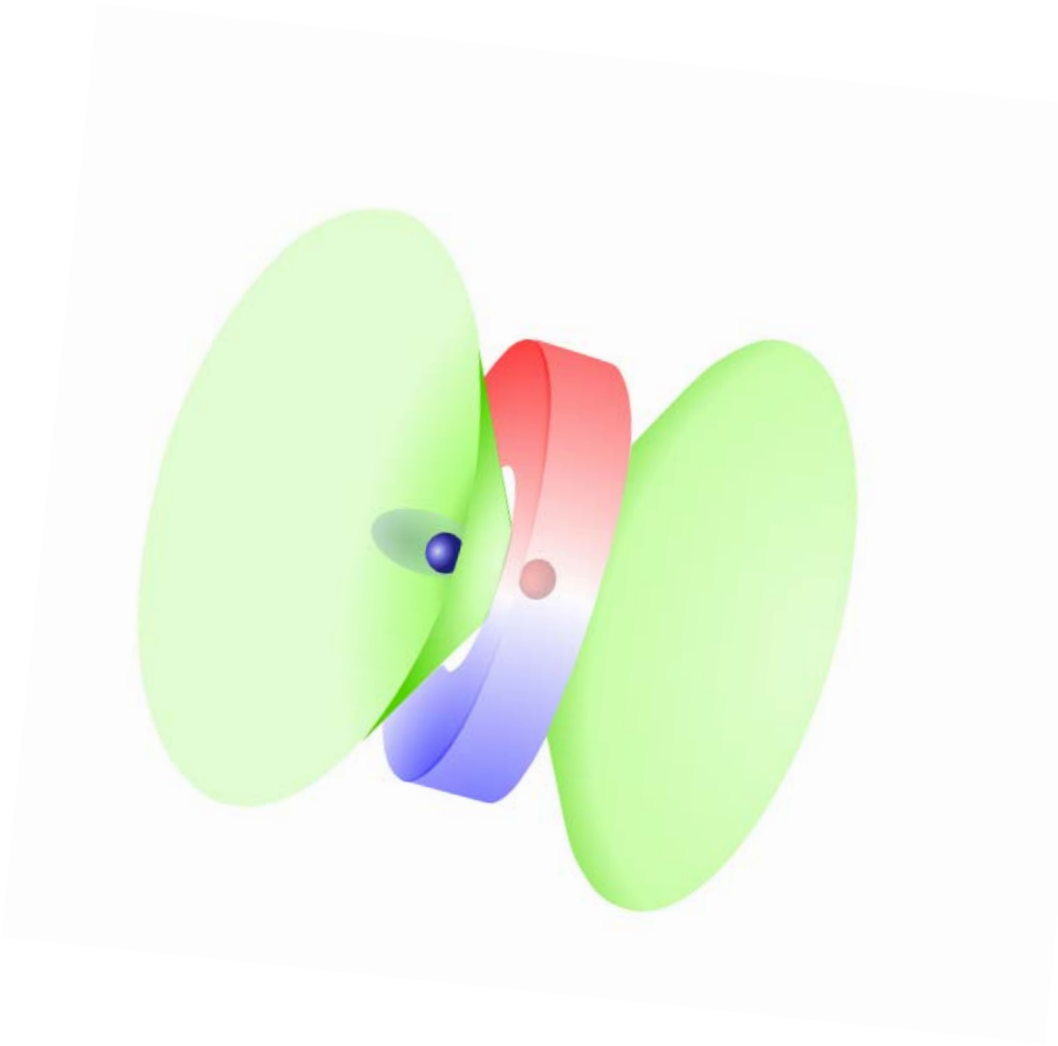

Av2
Weigth
0.20
0.15
0.10
0.05
0.00
-0.05
4000
4500
5000
5500
6000
6500
7000
Wavelength (A)

AGN – the unifyed model

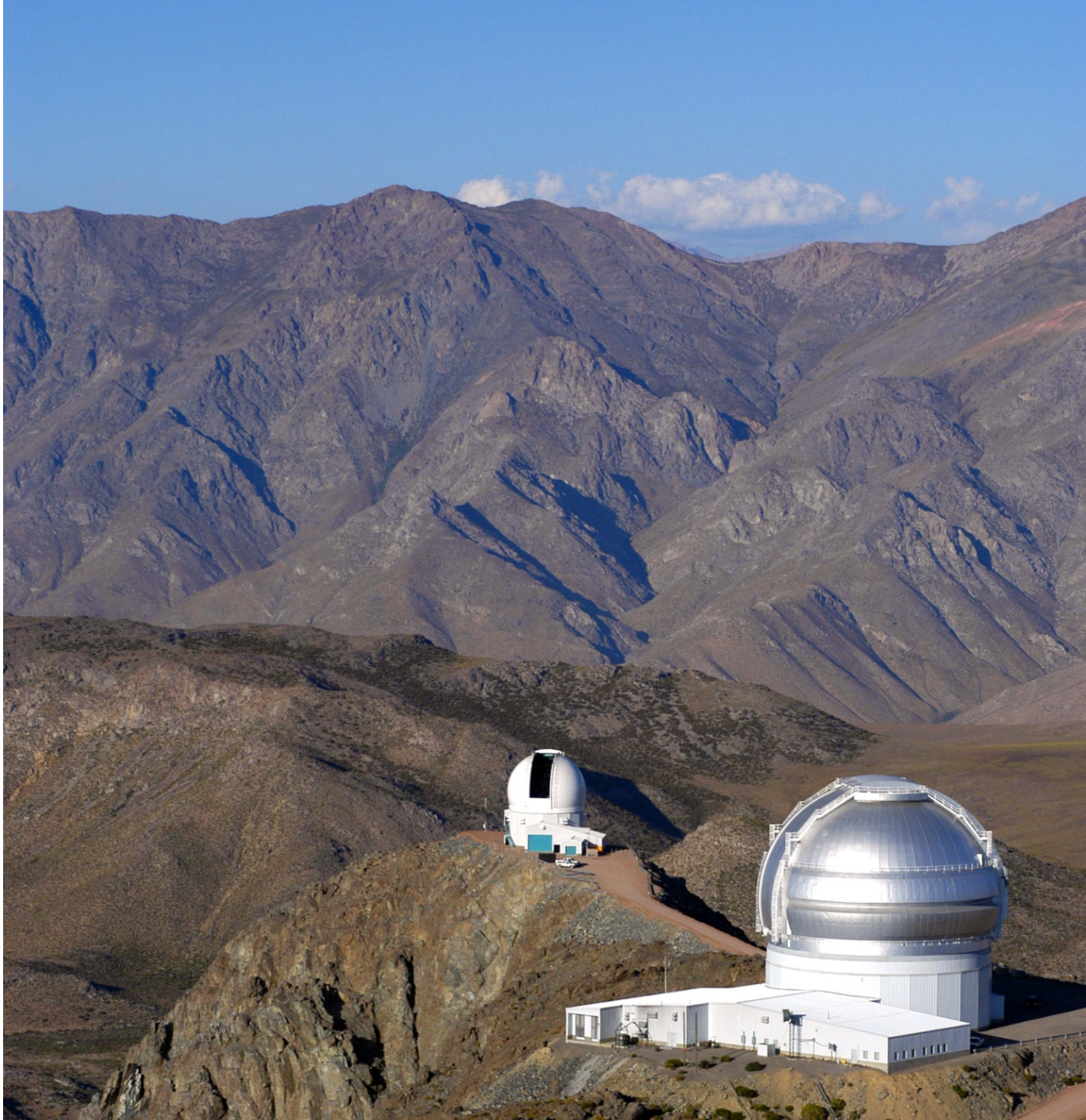


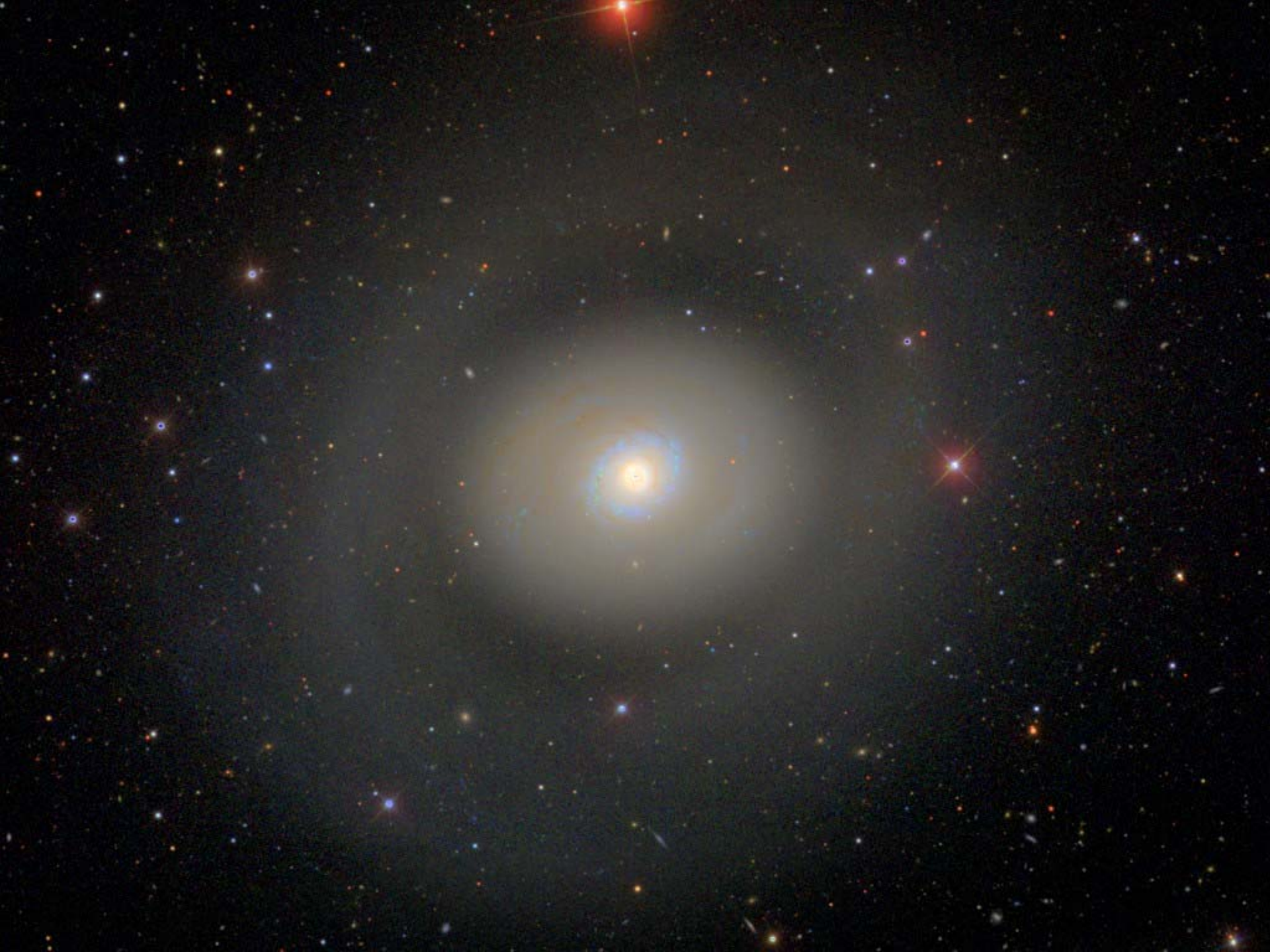




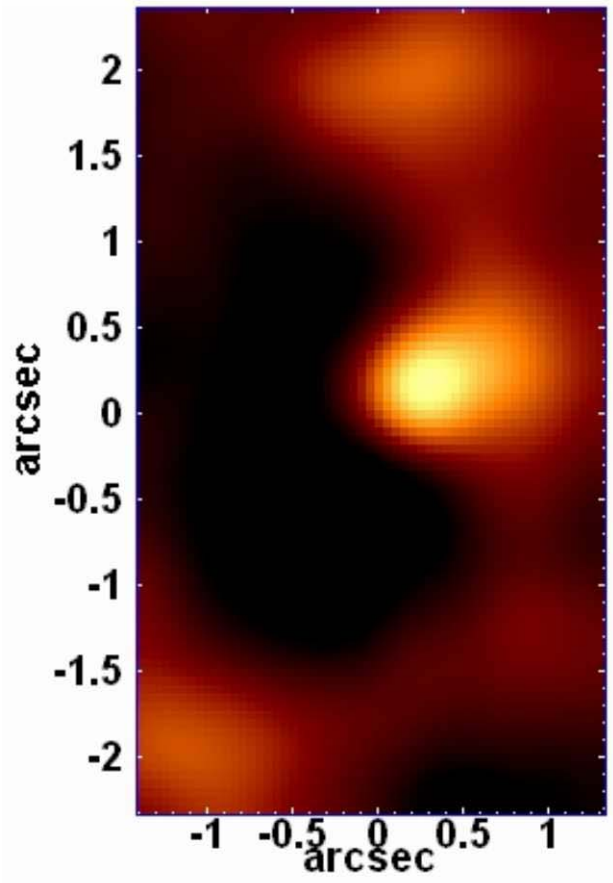


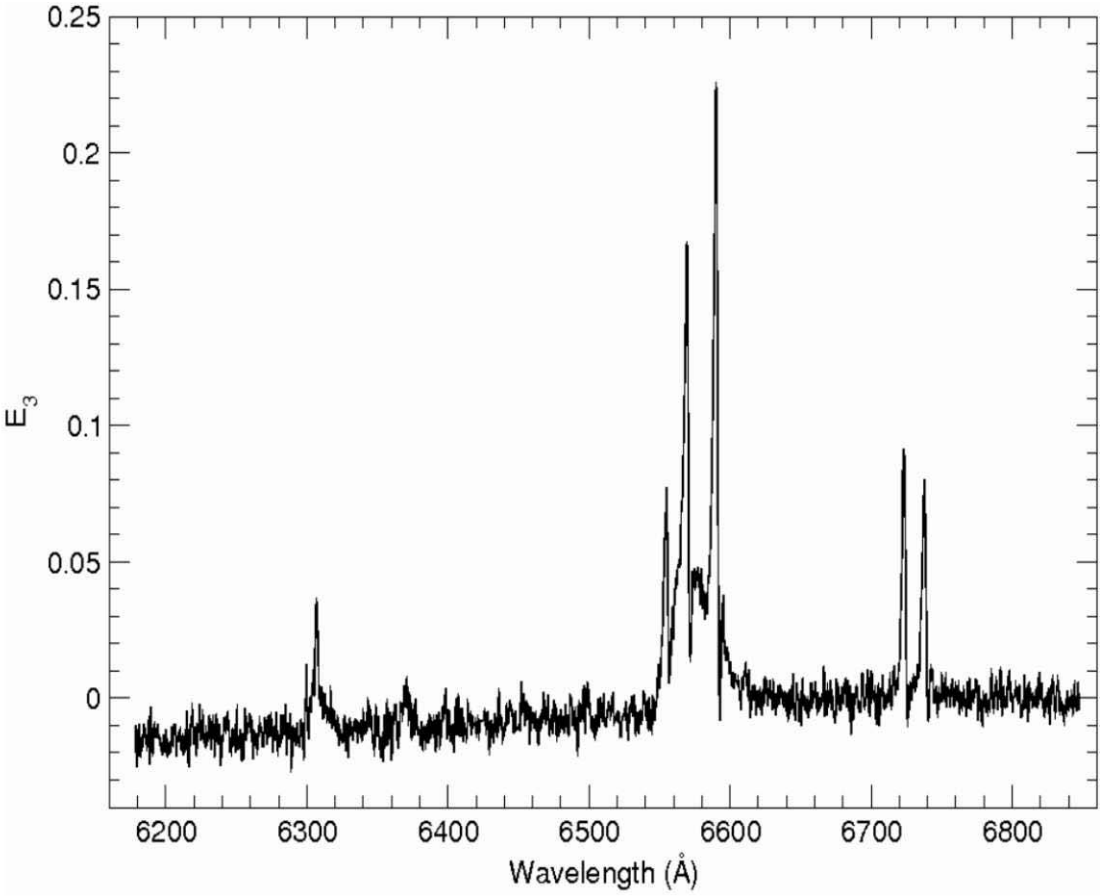
- Imagem dupla do núcleo ativo na galáxia elíptica NGC 7097



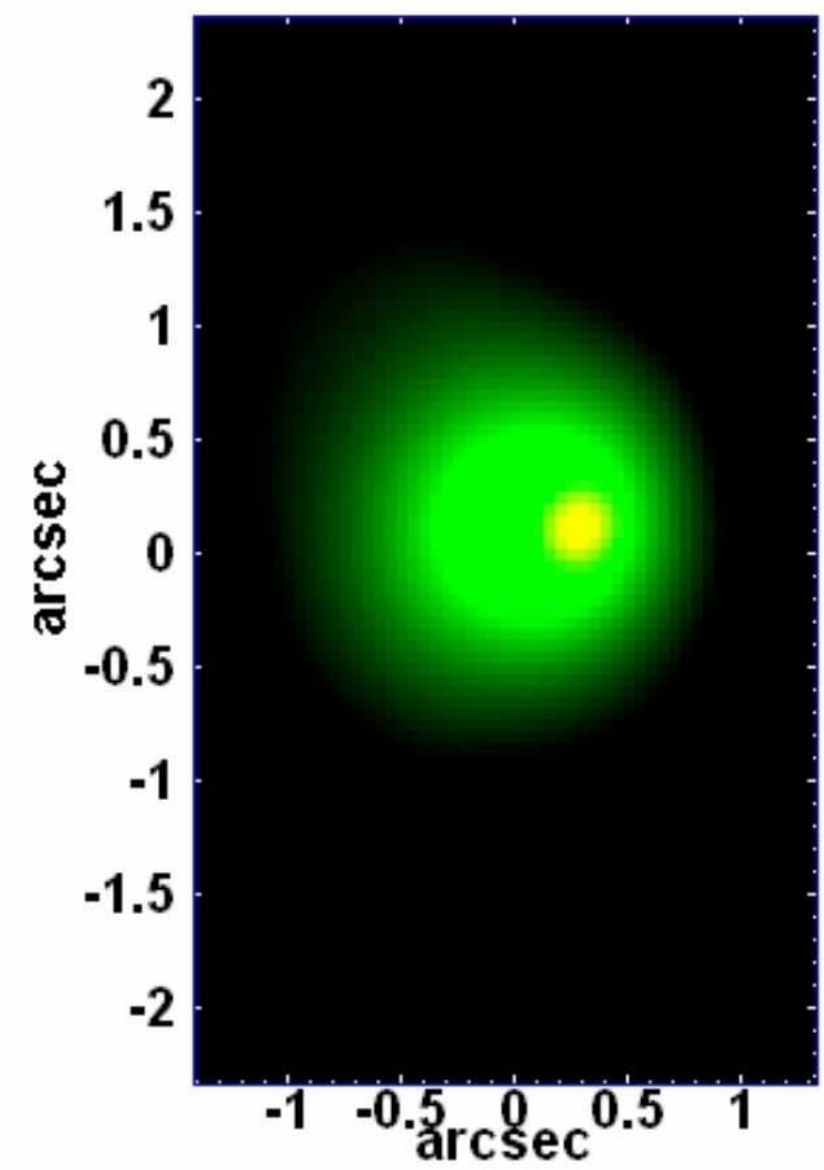


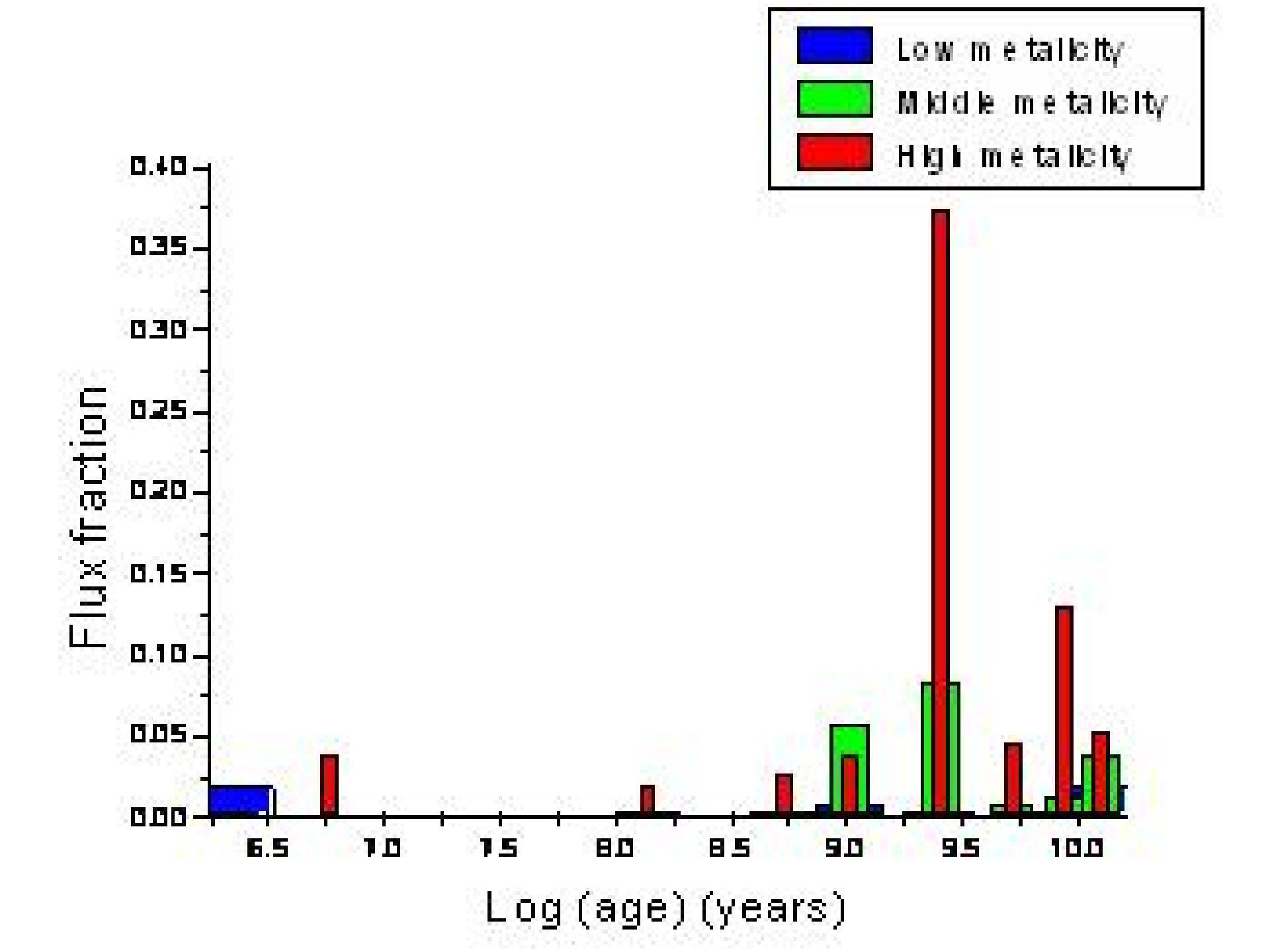
M 94


arcsec
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-1
-0.5
0
0.5
1
arcsec


0.25
0.2
0.15
0.1
0.05
0
E3
6200
6300
6400
6500
6600
6700
6800
Wavelength (Å)

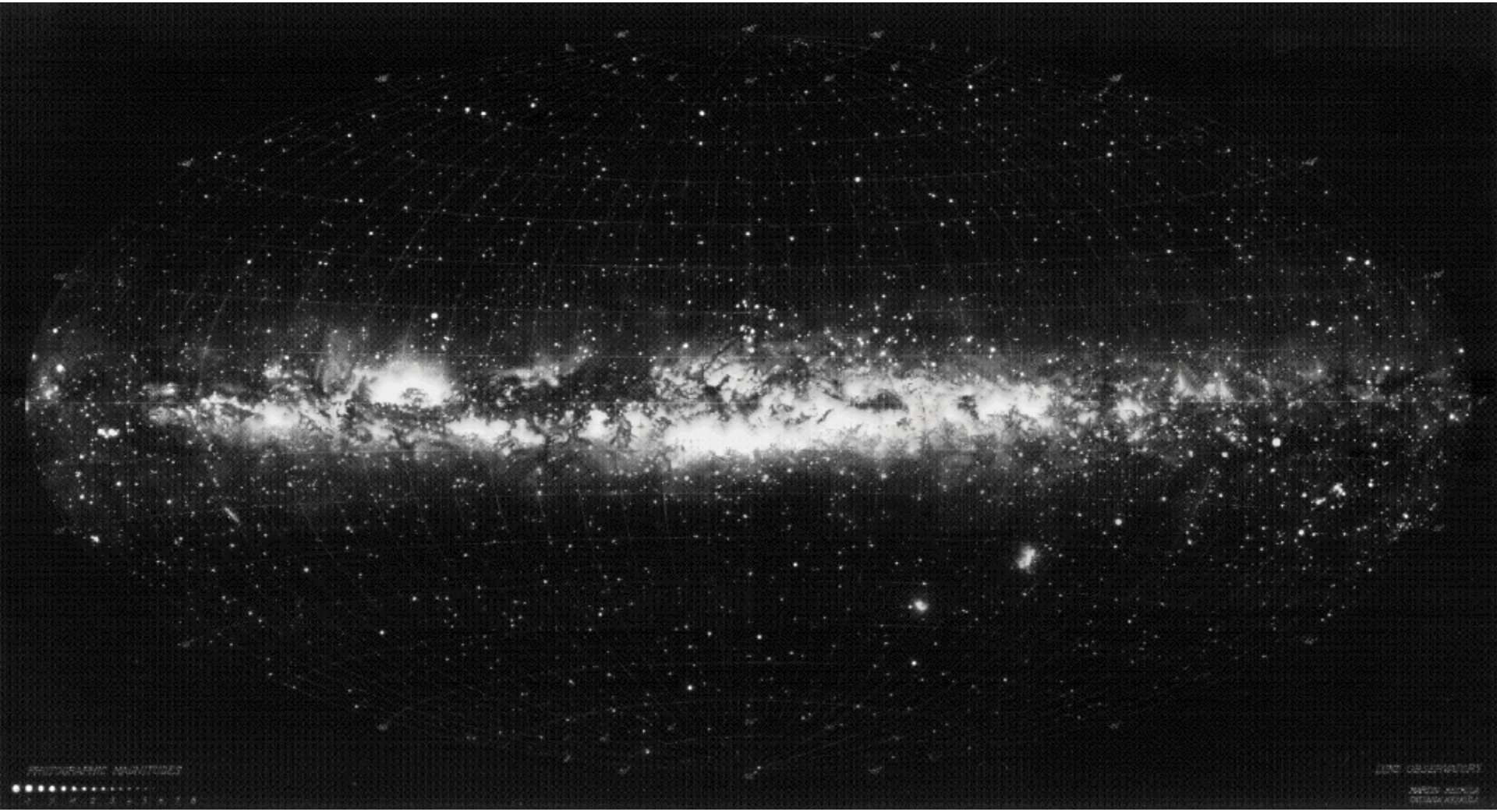
M 94



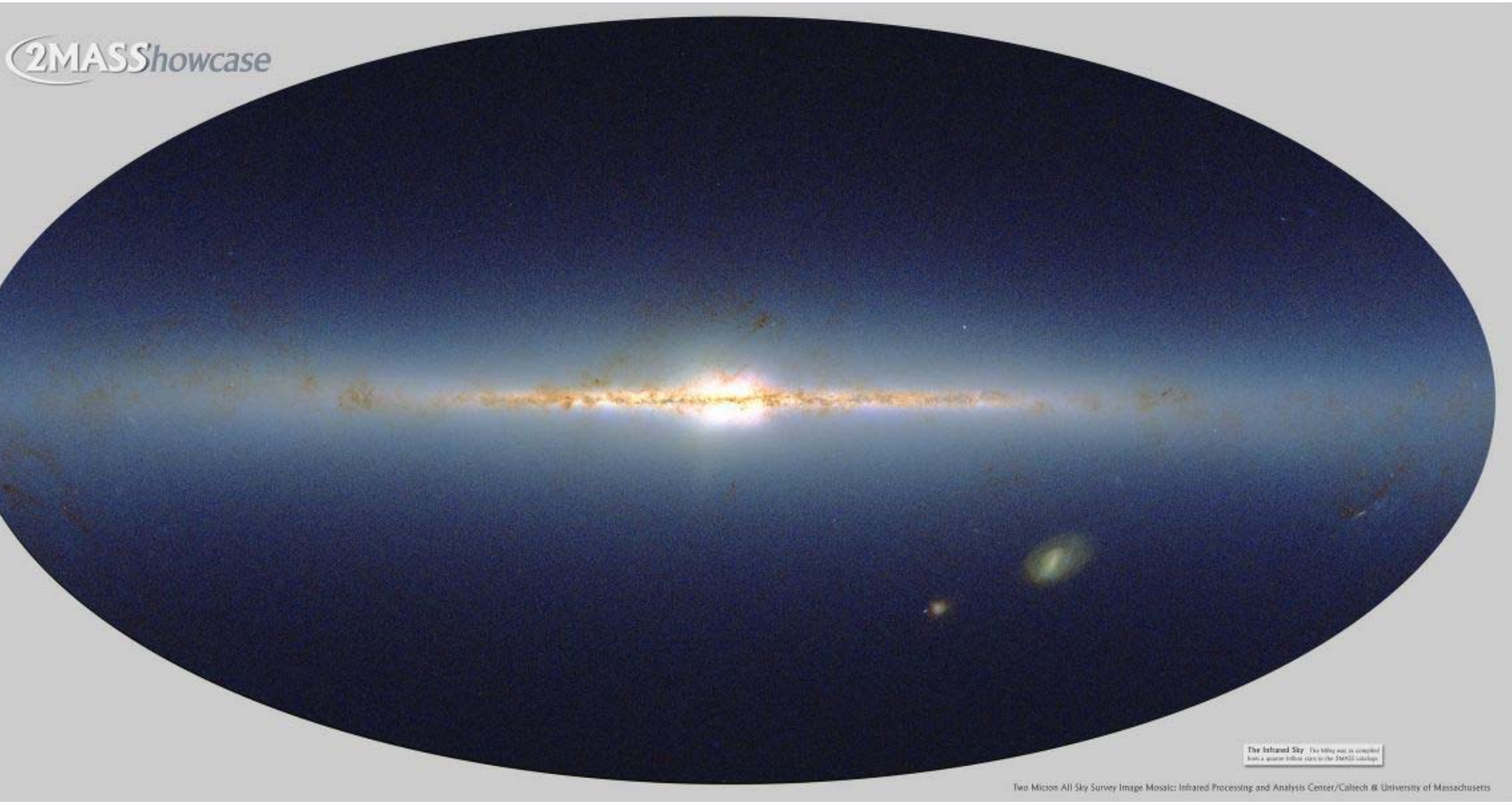

Low metallicity
Middle metallicity
High metallicity
Flux fraction
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
Log (age) (years)

Avanços importantes da última década

- Confirmação do buraco negro supermassivo da Via Láctea
- Medidas de momento angular em buracos negros estelares (8) e supermassivos (5)
- Paradigma da co-evolução entre galáxias e buracos negros


PHOTOGRAPHIC MAGNITUDES
LICK OBSERVATORY

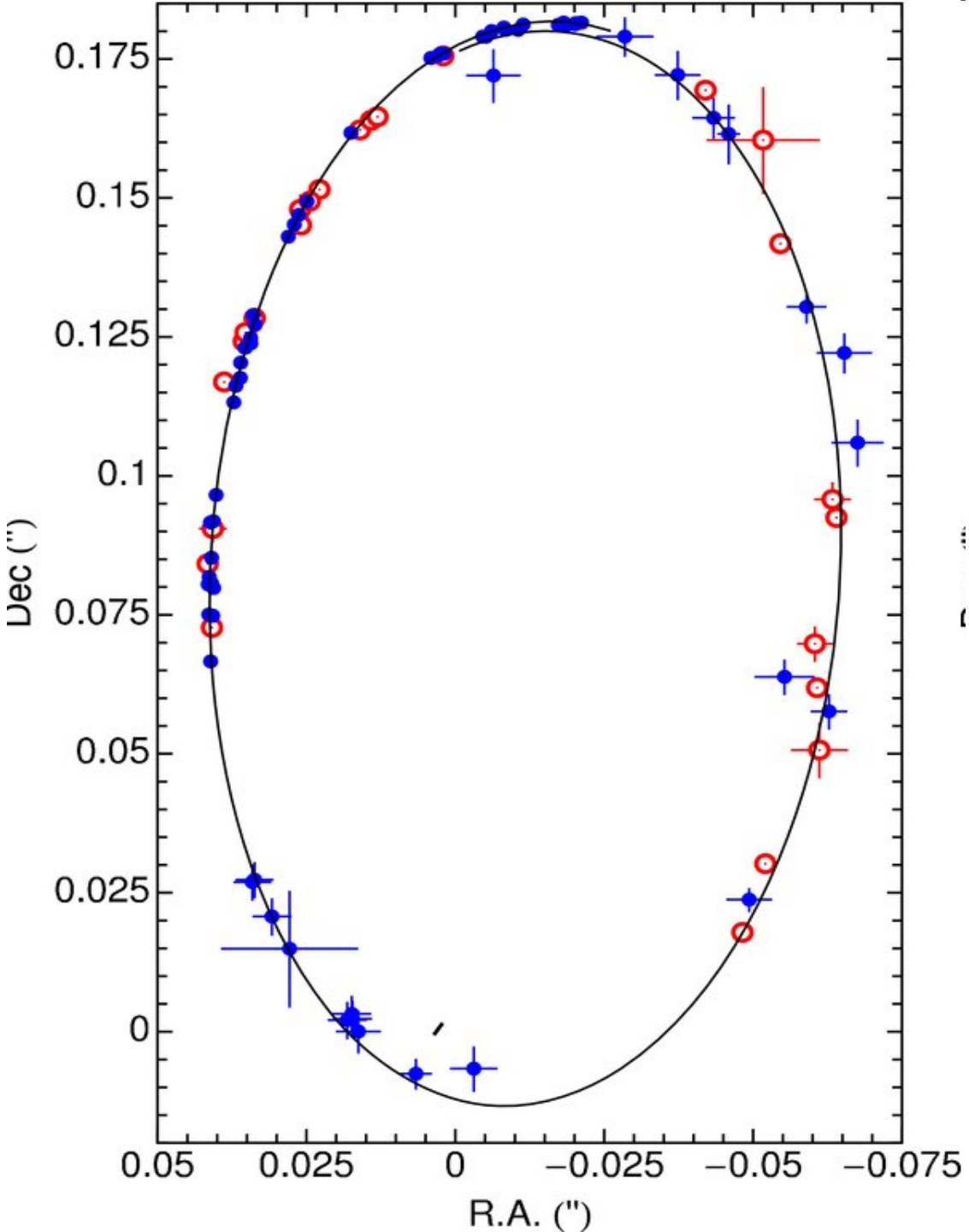
Via Láctea no infra-vermelho

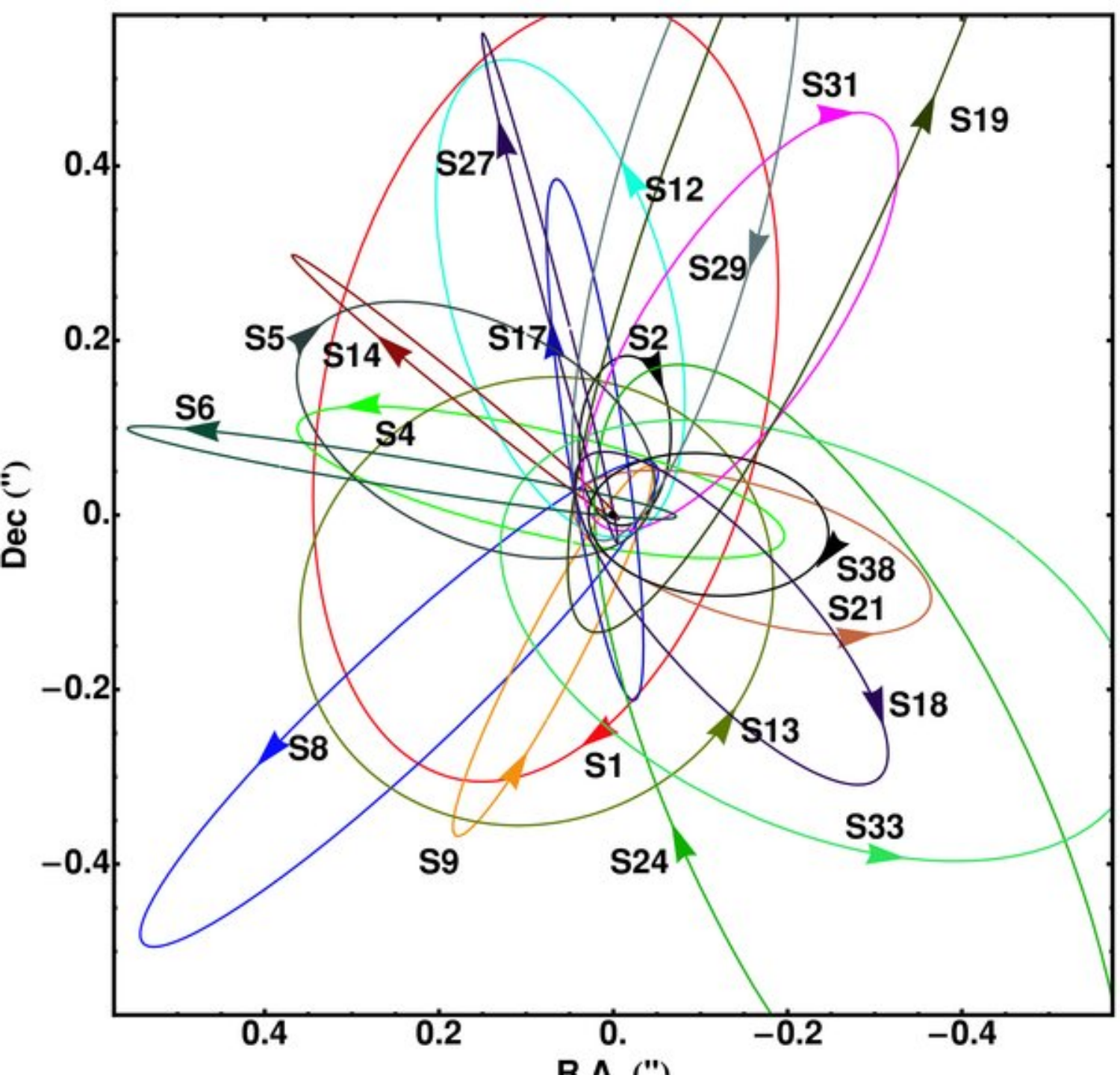


Gillessen et al 2009
ApJ 707, L114

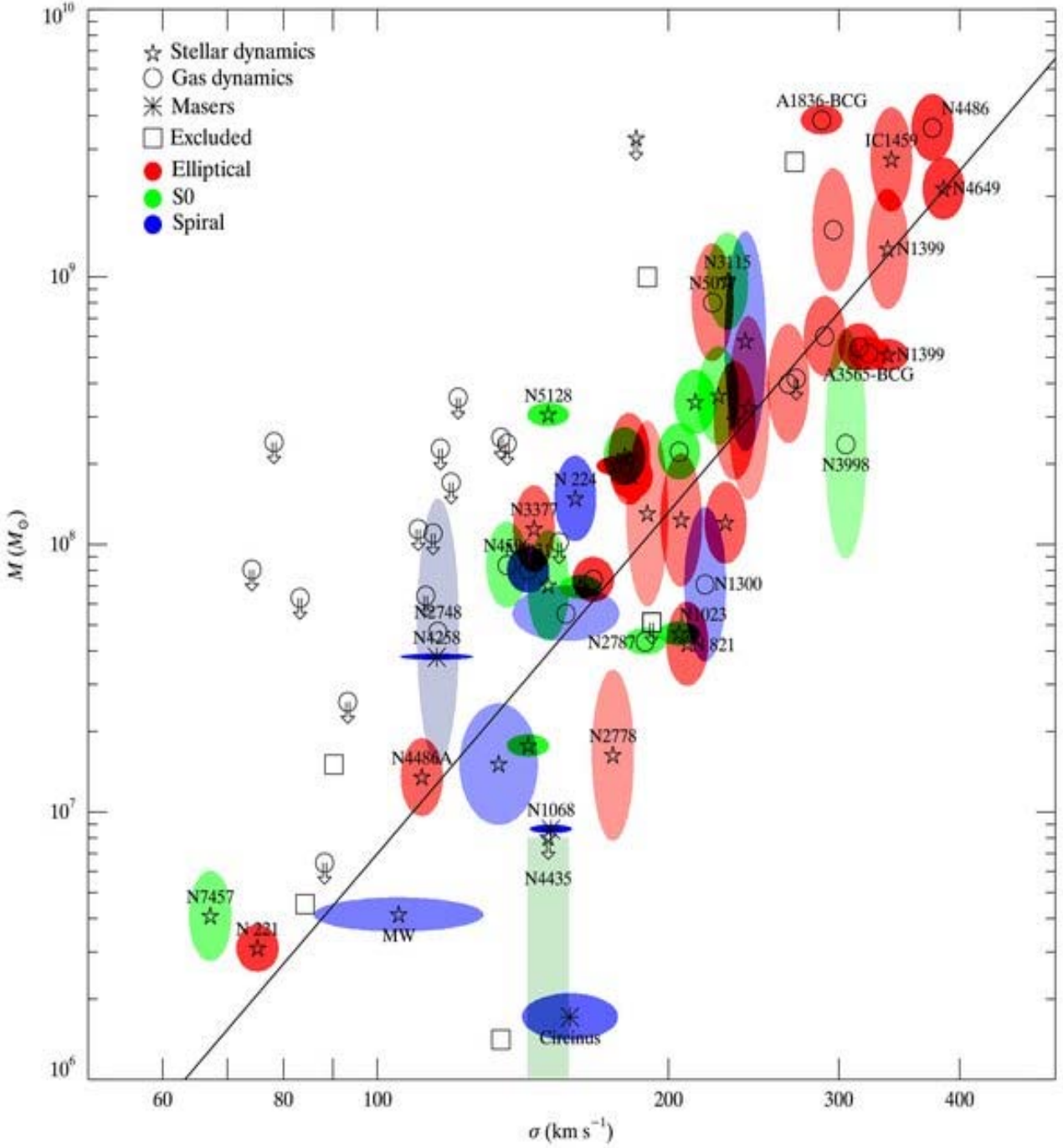
Blue = VLT
Red = Keck

M = 4.30+/-0.30 Million M_{sun}
Ro = 8.28+/-0.29 Kpc

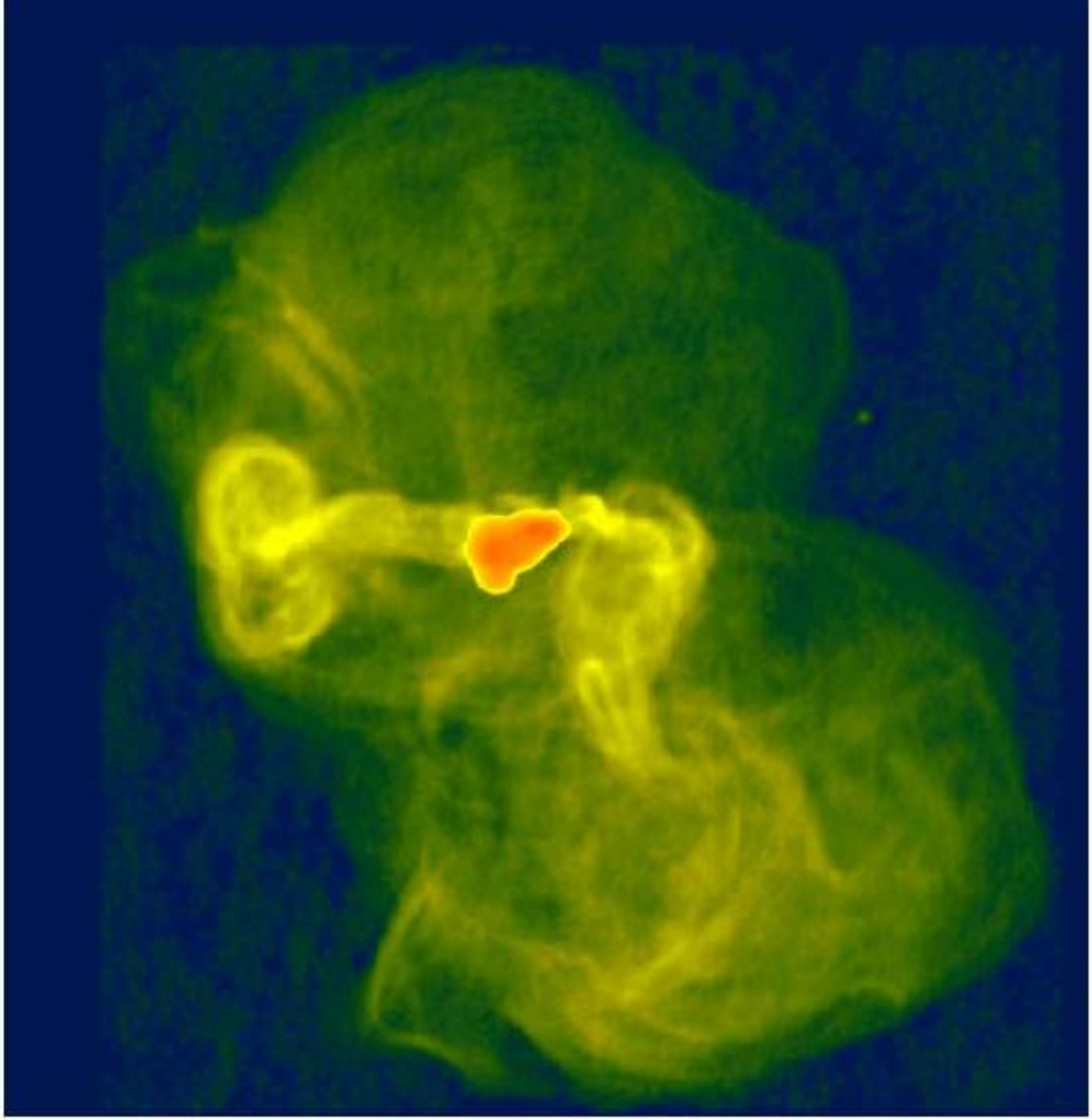



S31
S19
S27
S12
S29
S5
S14
S17
S2
S6
S4
S38
S21
S18
S8
S13
S1
S33
S9
S24
0.4
0.2
0.
−0.2
−0.4
Dec (")
0.4
0.2
0.
−0.2
−0.4
R.A. (")


Don Dixon / cosmographica.com


Stellar dynamics
Gas dynamics
Masers
Excluded
Elliptical
S0
Spiral
A1836-BCG
N4486
IC1459
N4649
N1399
N3115
N5077
N1399
A3565-BCG
N5128
N3998
N 224
N3377
N1300
N2748
N4258
N2787
N2778
N4486A
N1068
N4435
N7457
N 221
MW
Circinus
$M\ (M_\odot)$
σ (km s^{-1})
10^{10}
10^{9}
10^{8}
10^{7}
10^{6}
60
80
100
200
300
400

M 87
em rádio



Obrigado