RUB

RUHR-UNIVERSITÄT BOCHUM

The Radio Halos of NGC 7090 and NGC 7462

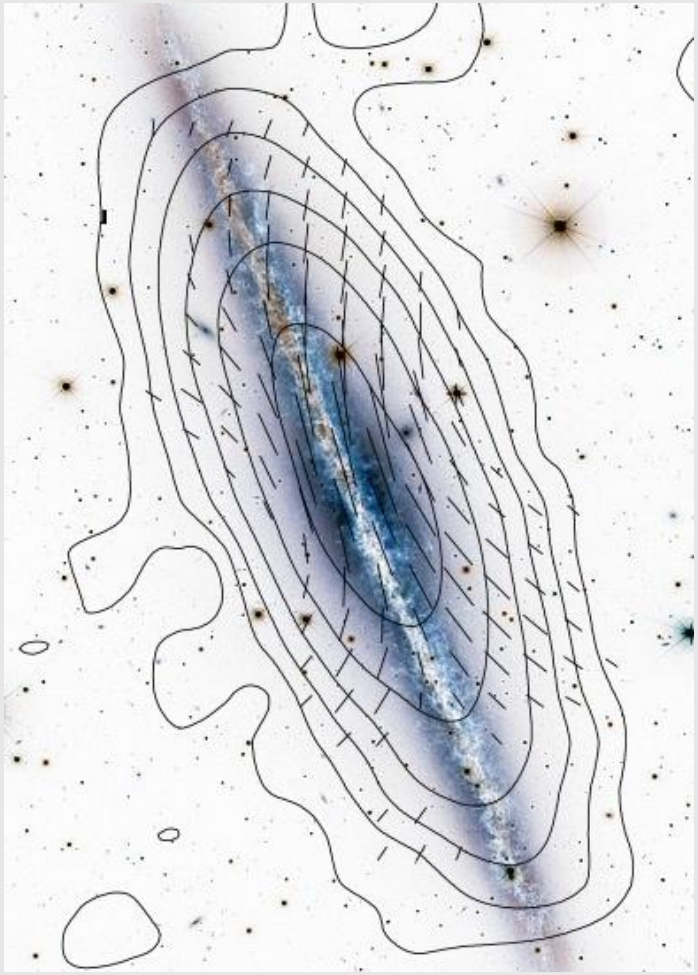
FAKULTÄT FÜR PHYSIK UND ASTRONOMIE
Lehrstuhl für Astronomie

Yelena Stein

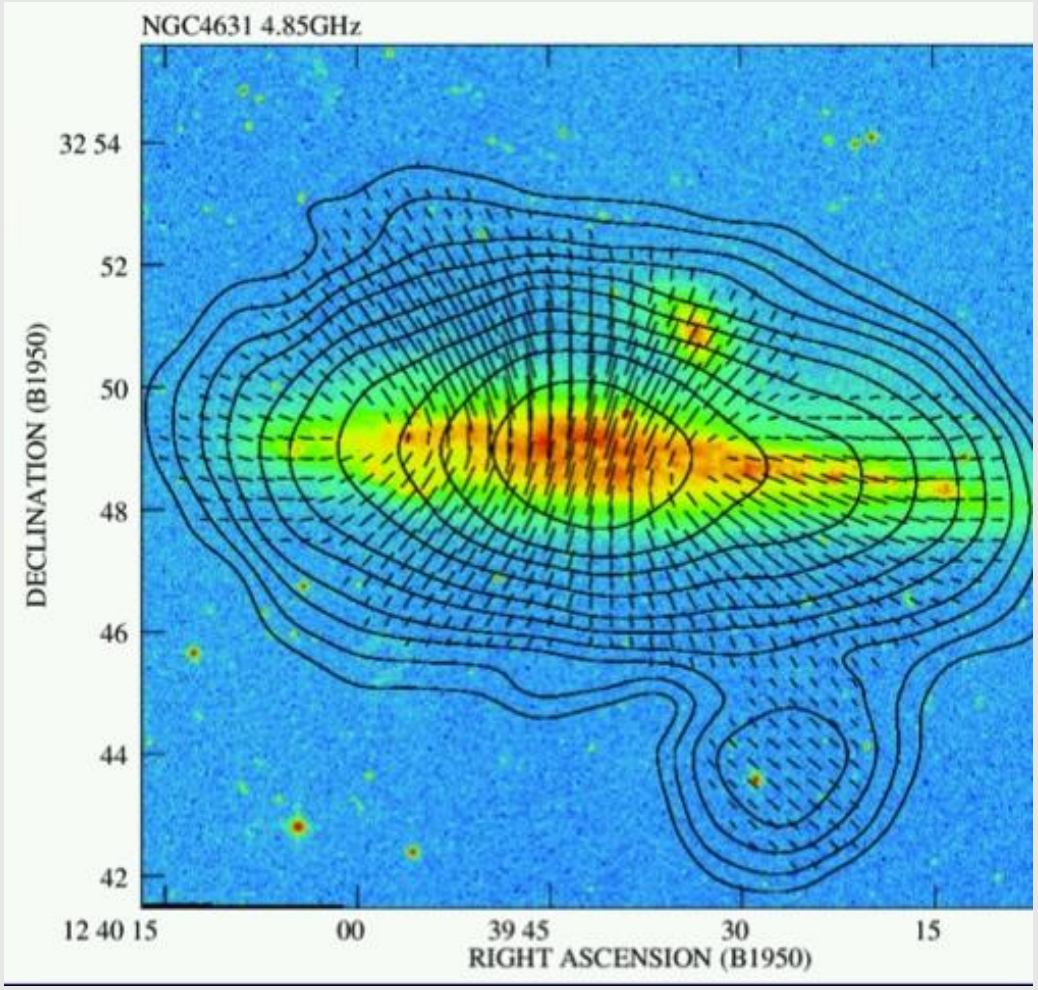
Motivation

- The strength of magnetic fields influences the evolution of galaxies and galaxy clusters.
  - interaction in the past
  - seems to be connected to starbursts.
- Most of the visible material is coupled to magnetic fields.
- FIR Radio correlation
  - Not completely understood

Magnetic fields in Edge-on Spiral Galaxies



Edge-on spiral galaxy NGC 891
(total and polarised intensity)
© M. Krause (MPIfR Bonn)



Edge-on spiral galaxy NGC 4631
(total and polarised intensity)

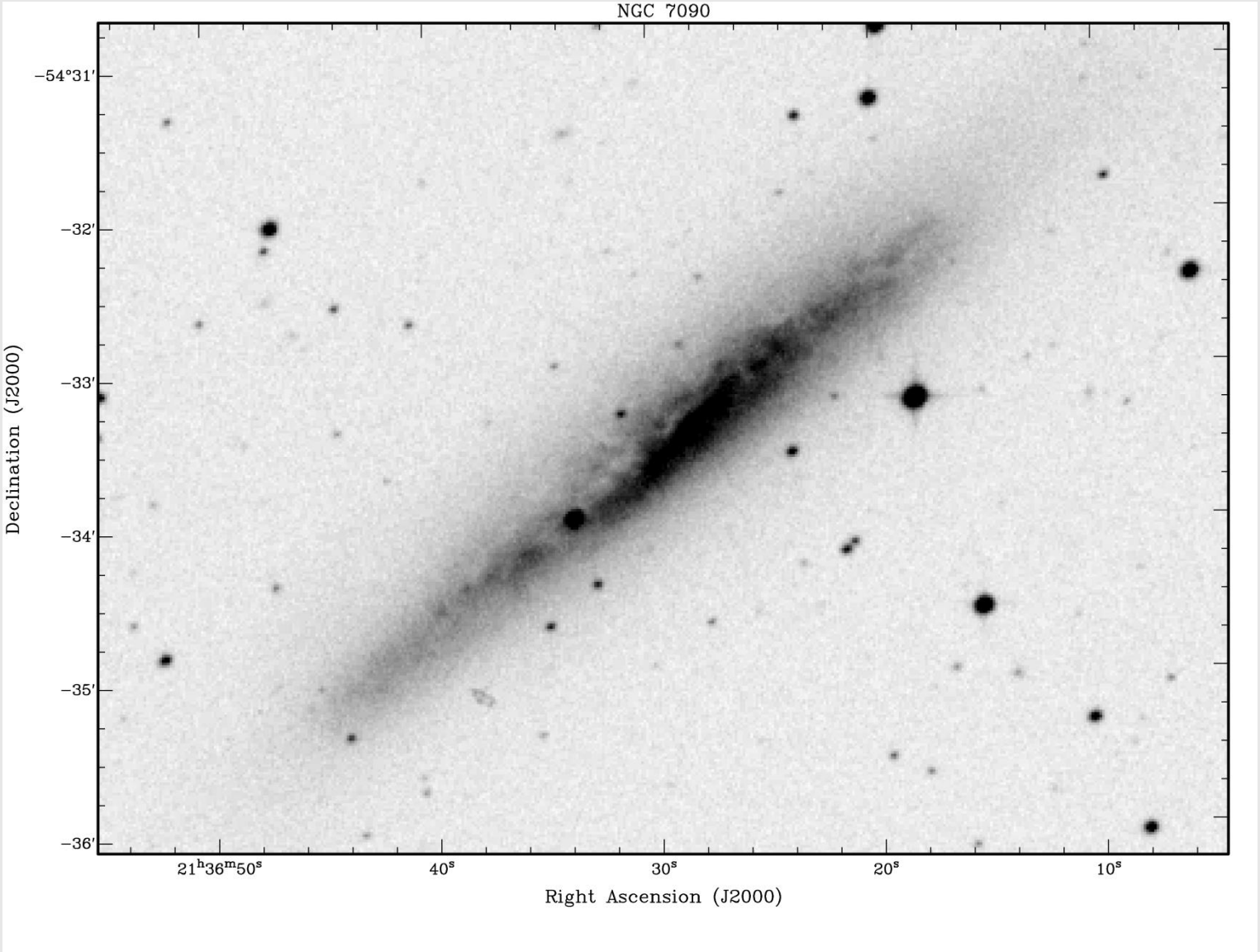
Data

- Participate in a project (NGC 7090 and NGC 7462)
  - Archive Data of the ATCA (6 cm and 20 cm)
  - Calibration and imaging (20 cm)

- NGC 7090
  - 8.4 Mpc
  - Incl 80°
  - 18 x 3.2 kpc

- NGC7462
  - 11,3 Mpc
  - Incl 80°
  - 13.8 x 2.3 kpc

NGC 7090 – DSS Image

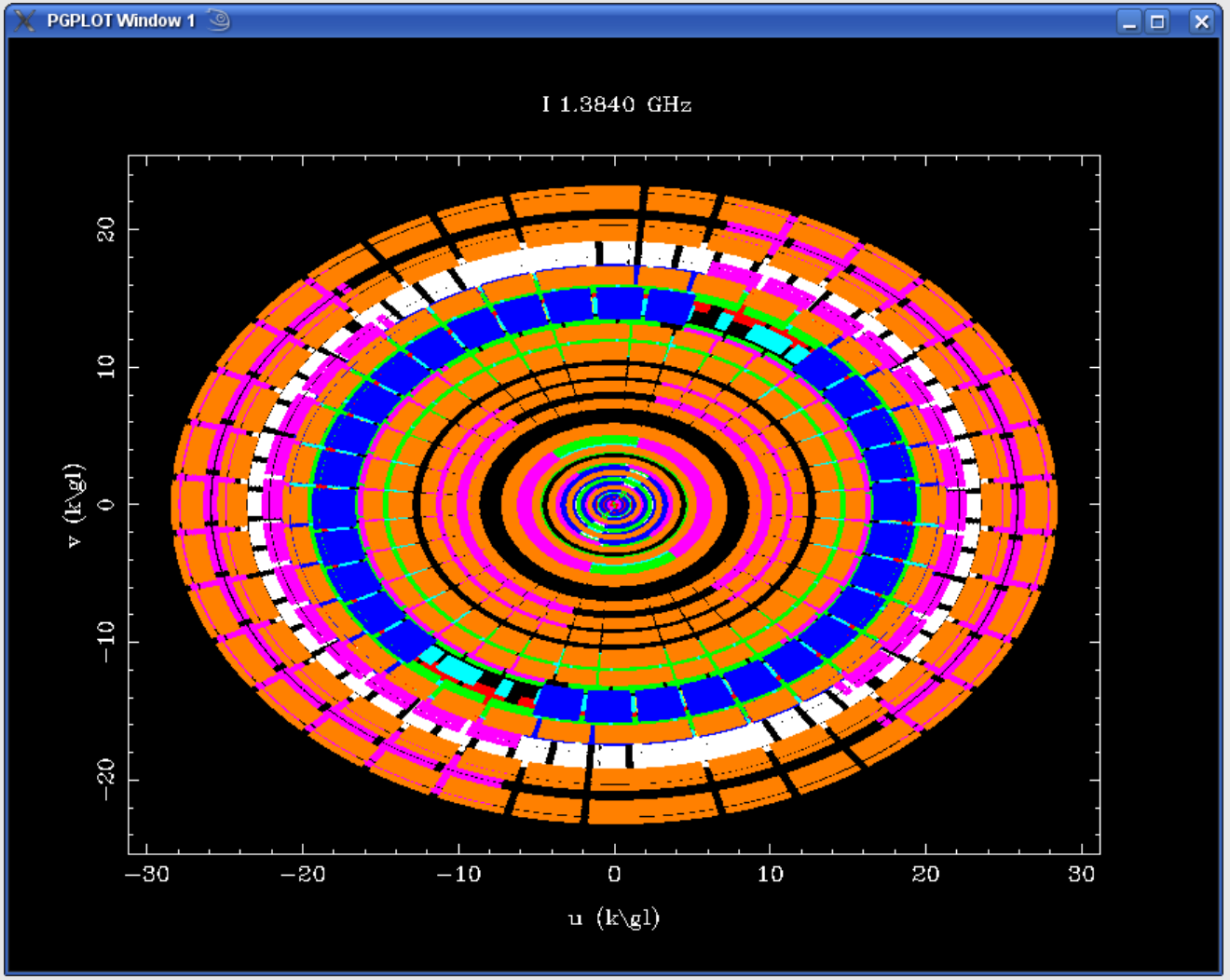


ATCA Archive Data

Configuration Name	Baselines (metres)														
6.0A α β	337	628	872	1087	1423	1500	1959	2296	2587	2923	3015	3352	4439	5311	5939
6.0B	214	536	750	949	1270	1806	2020	2219	2755	2969	3000	3214	3750	5020	5969
6.0C α β	153	413	643	1056	1577	1730	1990	2143	2633	2786	3214	3857	4270	5847	6000
6.0D	77	367	796	1163	1286	1362	2082	2158	2449	2525	3352	3429	4714	5510	5878
1.5A	153	321	429	566	719	750	888	1041	1316	1469	3000	3429	3750	4316	4469
1.5B α β	31	199	291	490	765	796	1056	1087	1255	1286	3015	3214	3505	4270	4301
1.5C α γ	77	260	337	459	689	949	1026	1148	1408	1485	3015	3092	3352	4041	4500
1.5D β γ	107	214	474	582	643	857	1117	1224	1332	1439	3000	3214	3857	4332	4439
750A γ	77	138	245	276	352	383	413	490	658	735	3015	3092	3367	3505	3750
750B	61	122	168	230	413	474	536	597	643	765	3735	3857	4270	4332	4500
750C	46	153	199	245	306	398	444	551	704	750	4270	4316	4469	4714	5020
750D γ	31	107	184	291	398	429	582	612	689	719	3750	3857	4041	4439	4469
EW367 δ	46	61	92	138	168	214	230	276	306	367	4040	4102	4270	4316	4408
EW352 δ	31	46	77	107	122	153	199	245	321	352	4087	4286	4332	4408	4439
EW214	31	46	61	77	92	107	122	153	168	214	4286	4332	4408	4439	4500
NS214	31	46	61	77	107	107	138	168	184	214	4376	4376	4377	4379	4381
H214 ε	82	92	132	138	138	144	240	217	230	247	4270	4378	4383	4408	4500
H168 ε	61	61	107	111	132	141	168	171	185	192	4301	4379	4381	4408	4469
H75 ε	31	31	43	46	46	55	77	77	82	89	4332	4378	4378	4378	4408
122C	31	31	31	31	61	61	61	92	92	122	4376	4406	4437	4468	4498
Obsolete															
375	31	61	92	122	184	214	245	276	337	459	5510	5755	5786	5847	5969
210	31	31	46	61	107	138	153	168	183	214	4286	4332	4439	4469	4500
122A	31	31	31	31	61	61	61	92	92	122	5877	5908	5939	5969	6000
122B	31	31	31	31	61	61	61	92	92	122	5755	5786	5816	5847	5878

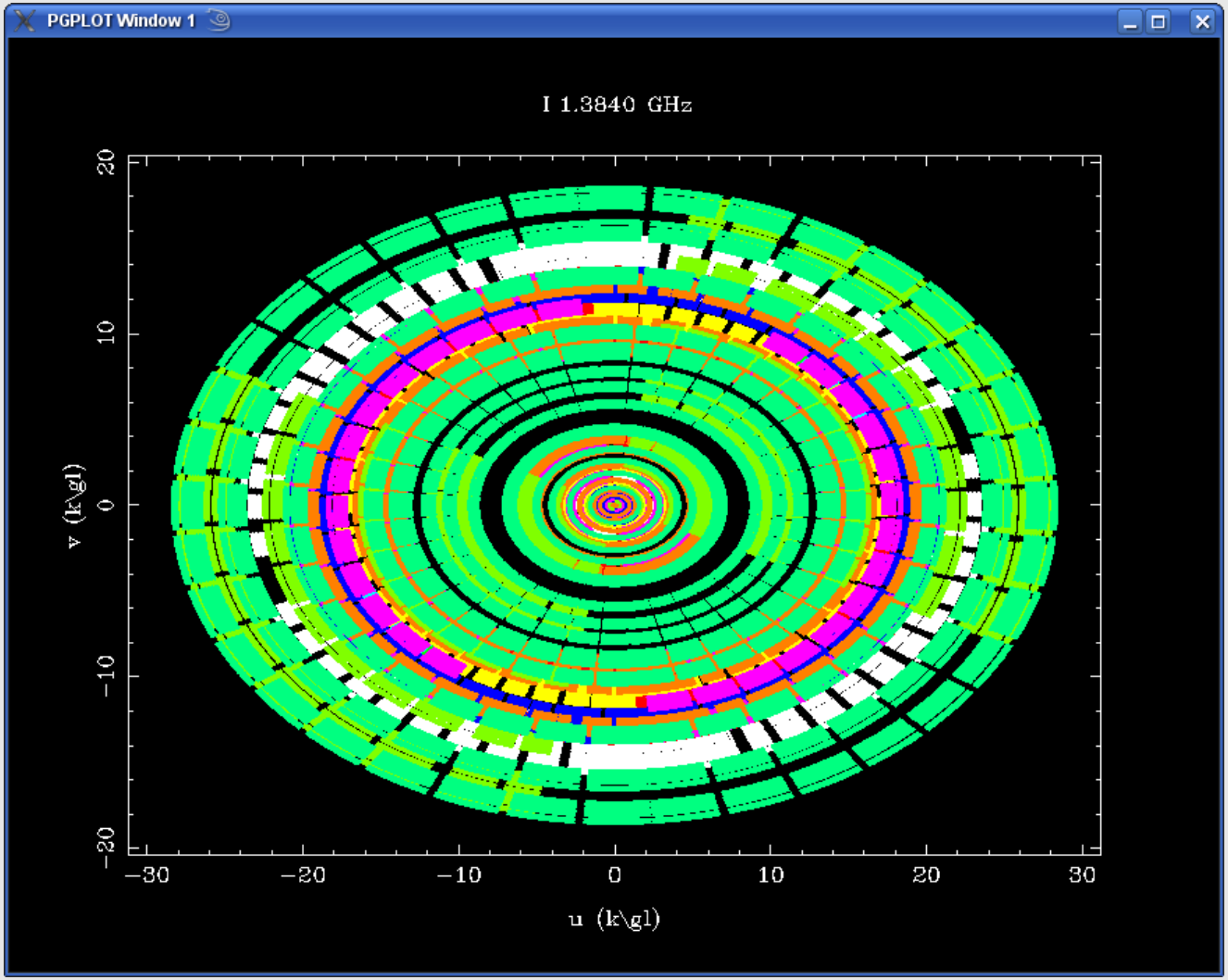
ATCA Archive Data

- NGC 7090
  - 7 different configurations, 8 observations



ATCA Archive Data

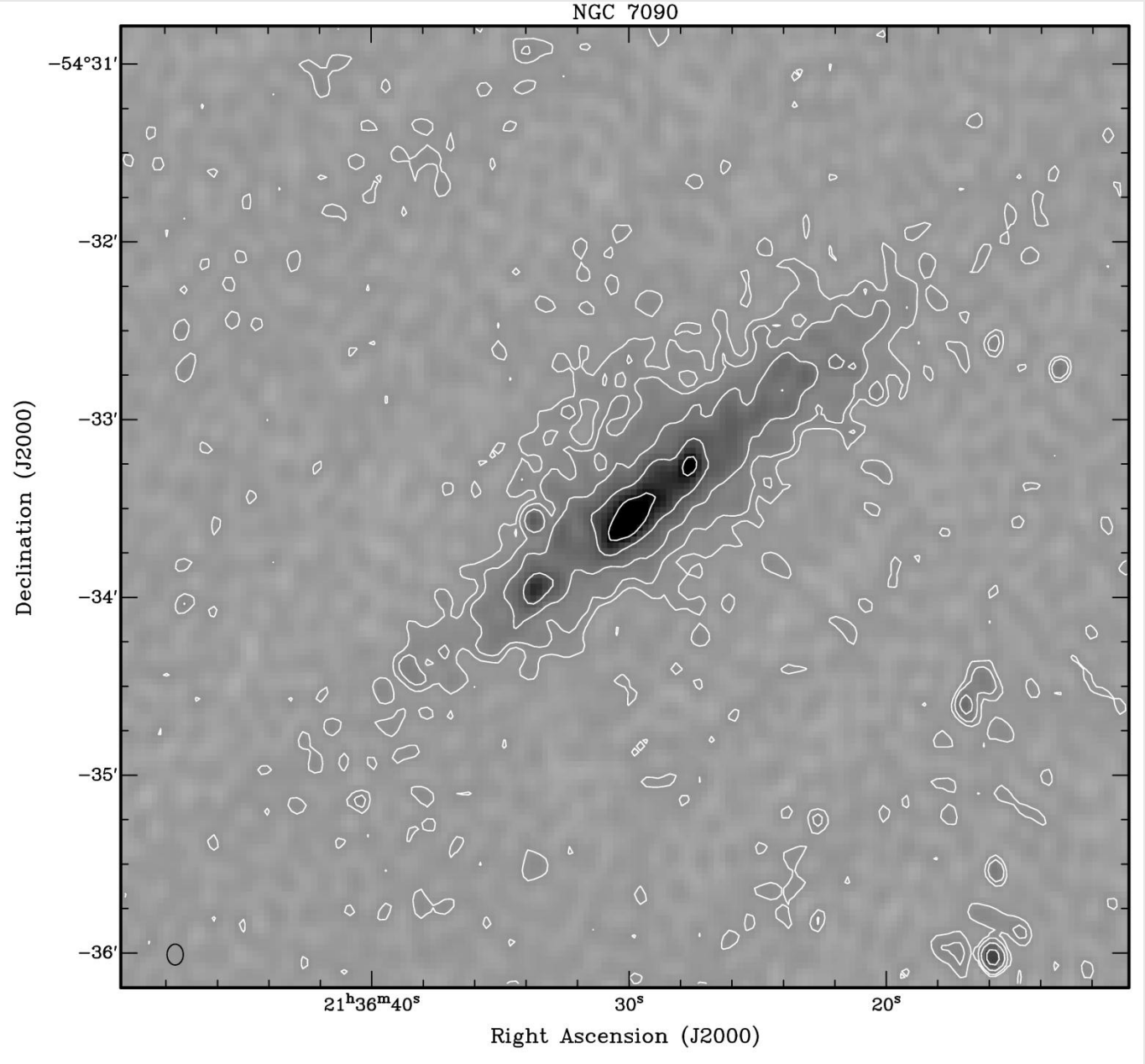
- NGC 7462
  - 7 different configurations, 8 observations



ATCA Observation

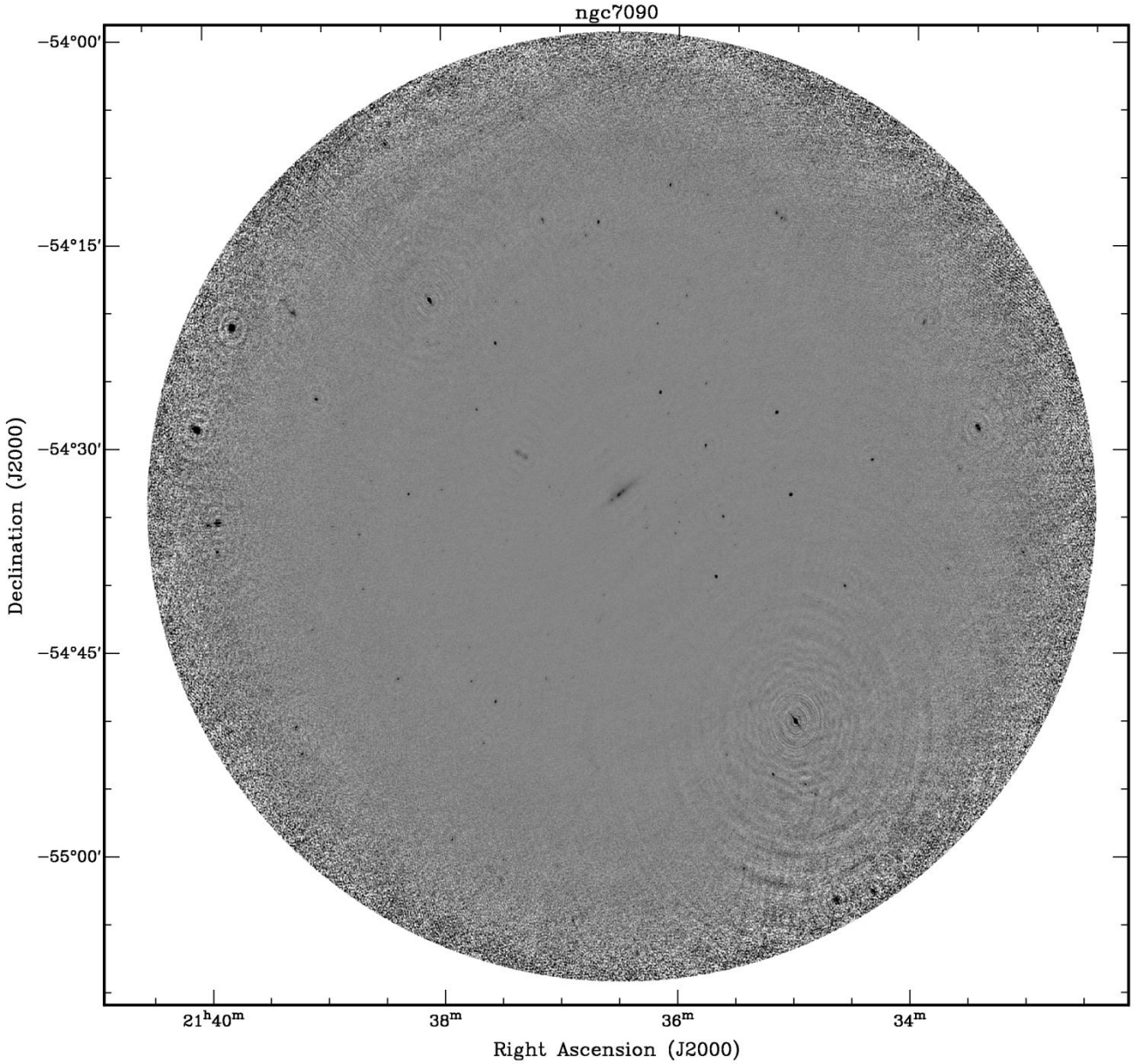
- Flagging in CASA (→ With MSInspector)
- Calibration in MIRIAD (primary calibrator 1938-634, secundary calibrator 2106-413 and 2117-642)
- Uvcat of the different configurations → double point
  - Checking the pointings → different before/after 2000
  - Uvedit with “nouv“ to shift the pointing
- Mask in CASA → With a python script (written by Arpad) → MIRIAD region file
- Selfcal in MIRIAD
- Primary beam correction (“linmos”)

First Results



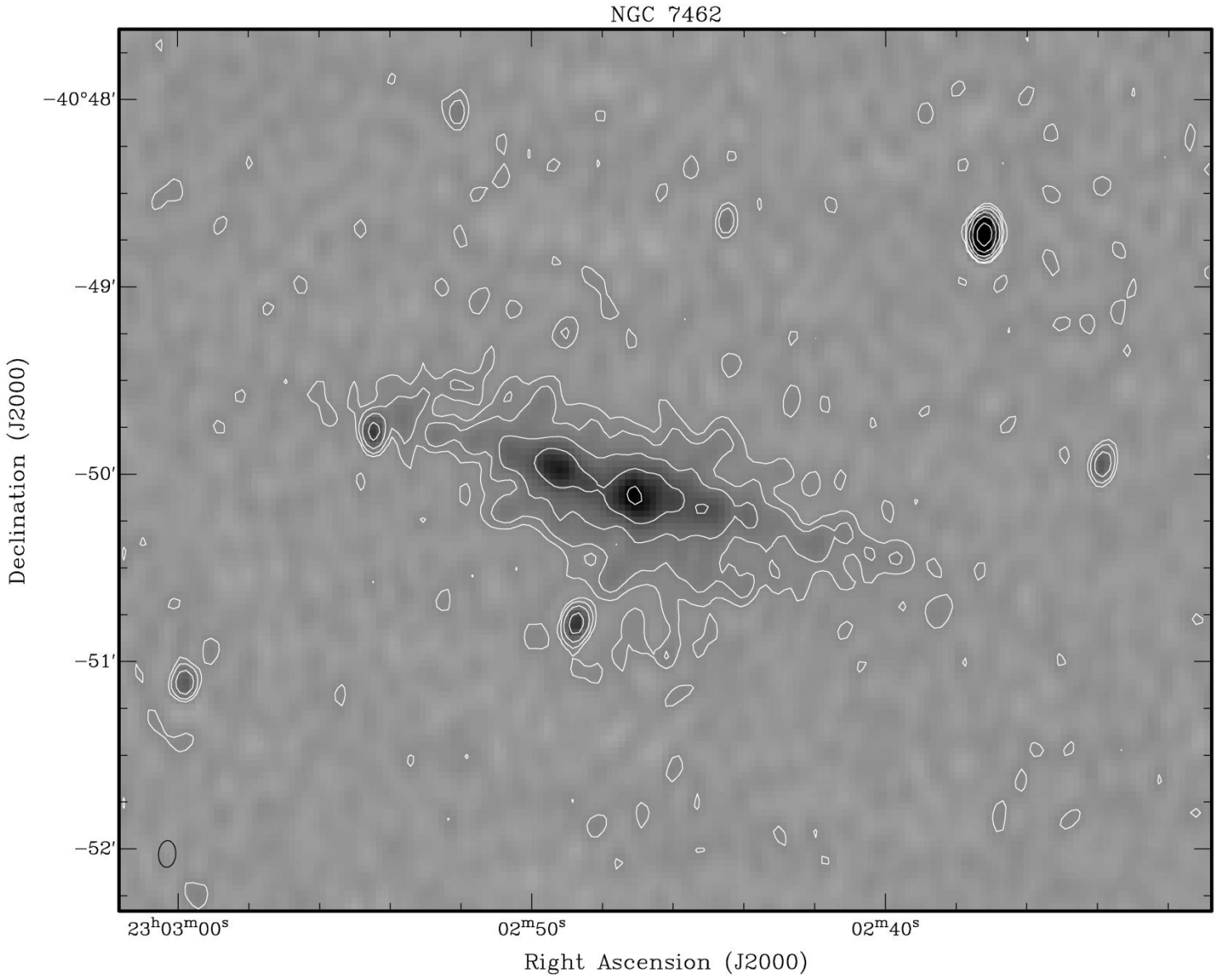
- Rms ~ 3E-5 Jy
- Conturs start at 9E-5 Jy

First Results

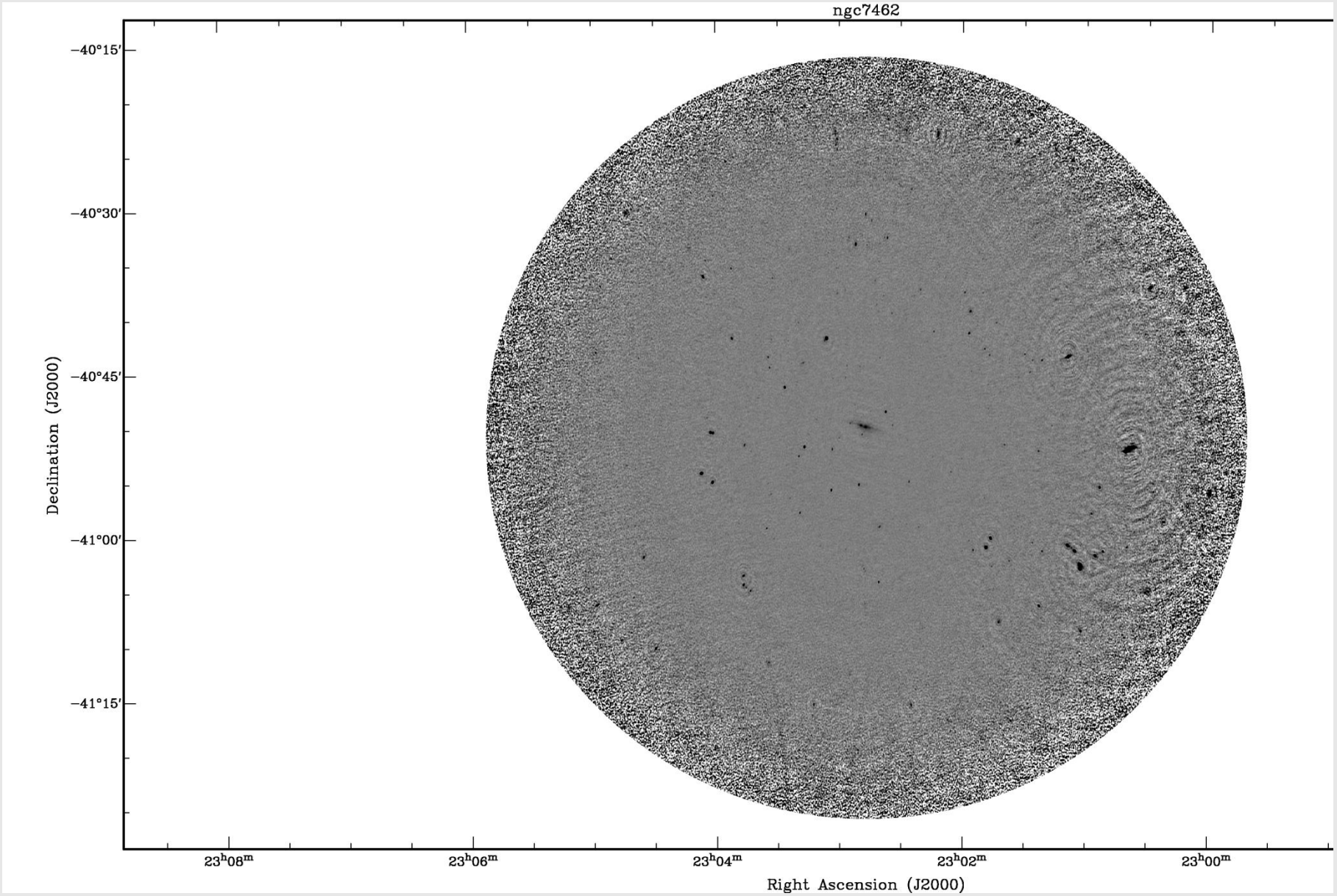


- To do:
  - Clean deeper
  - Peeling

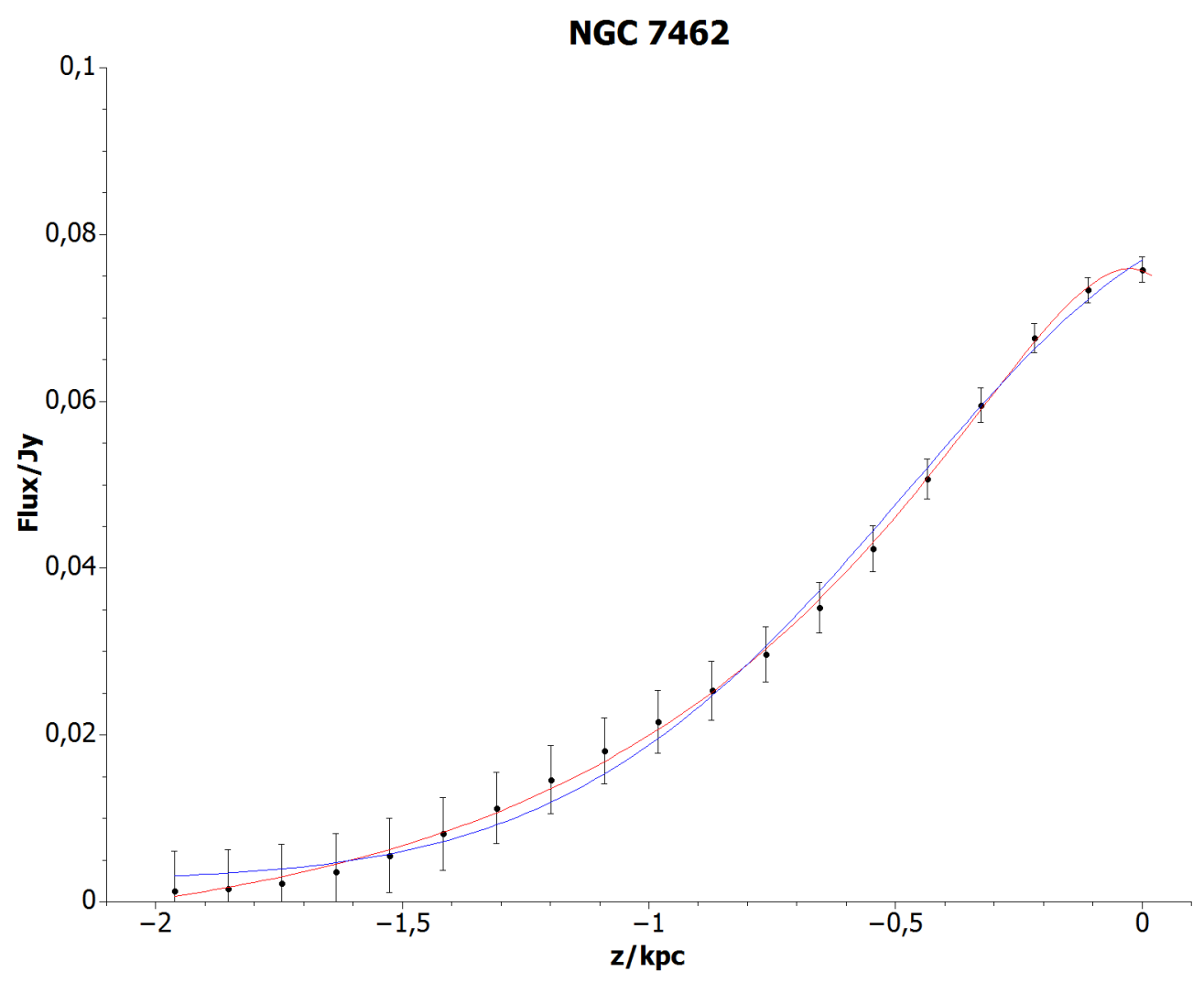
First Results



First Results

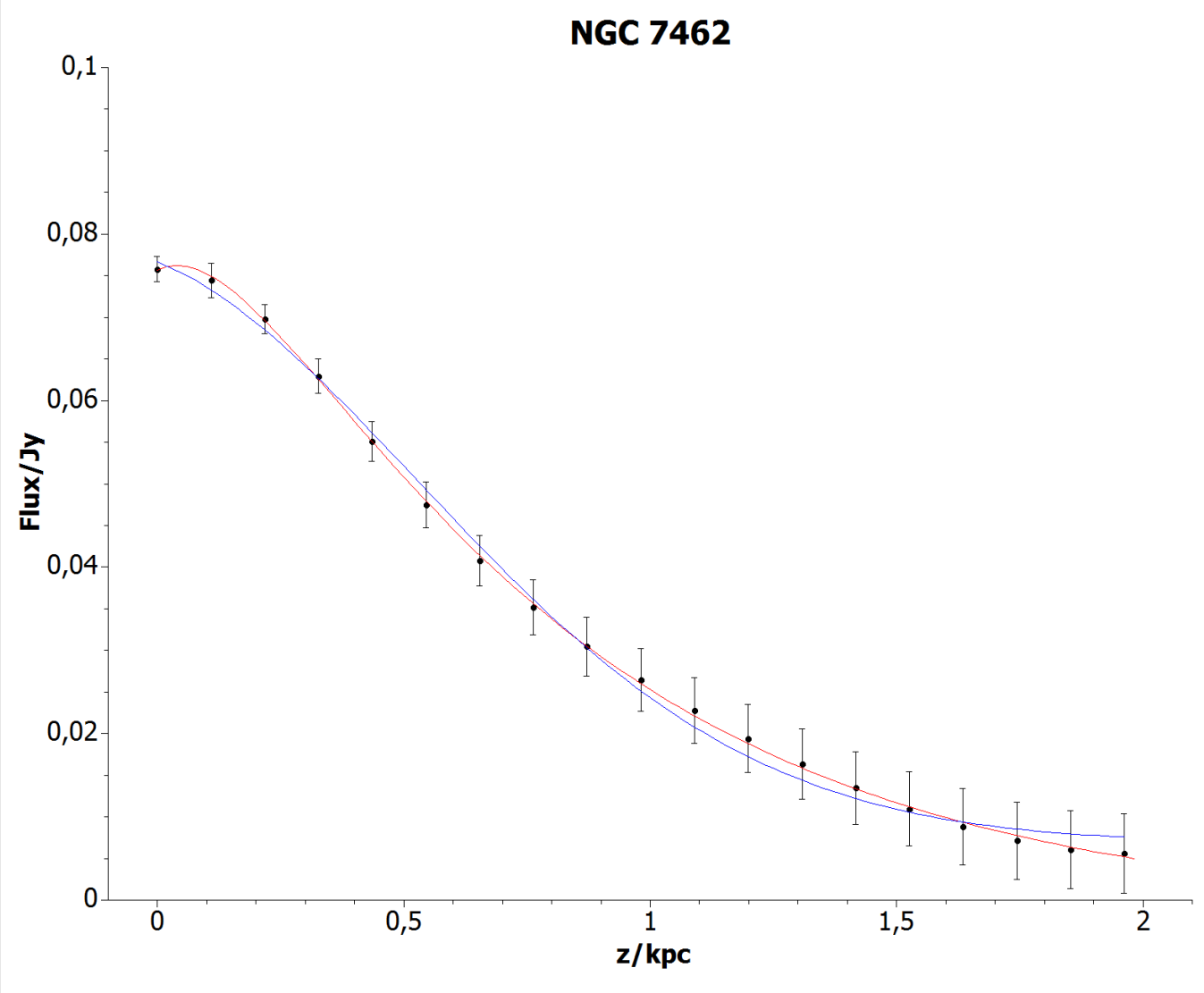


First Results

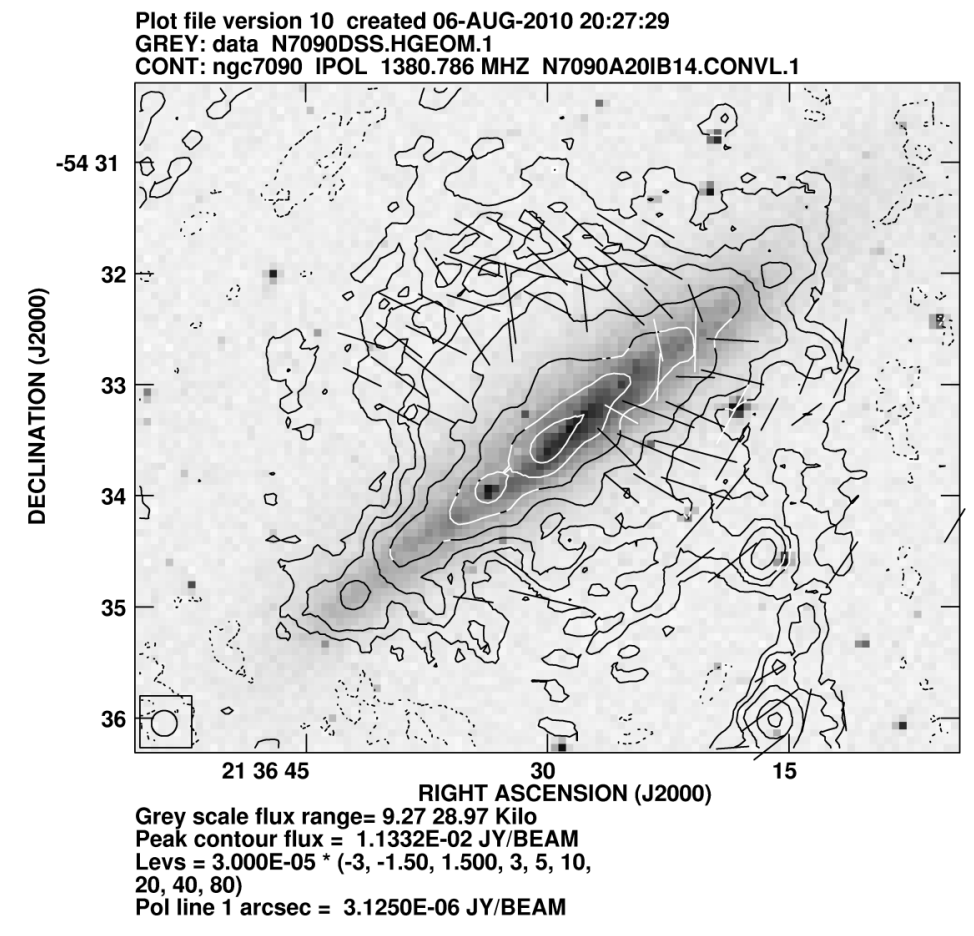


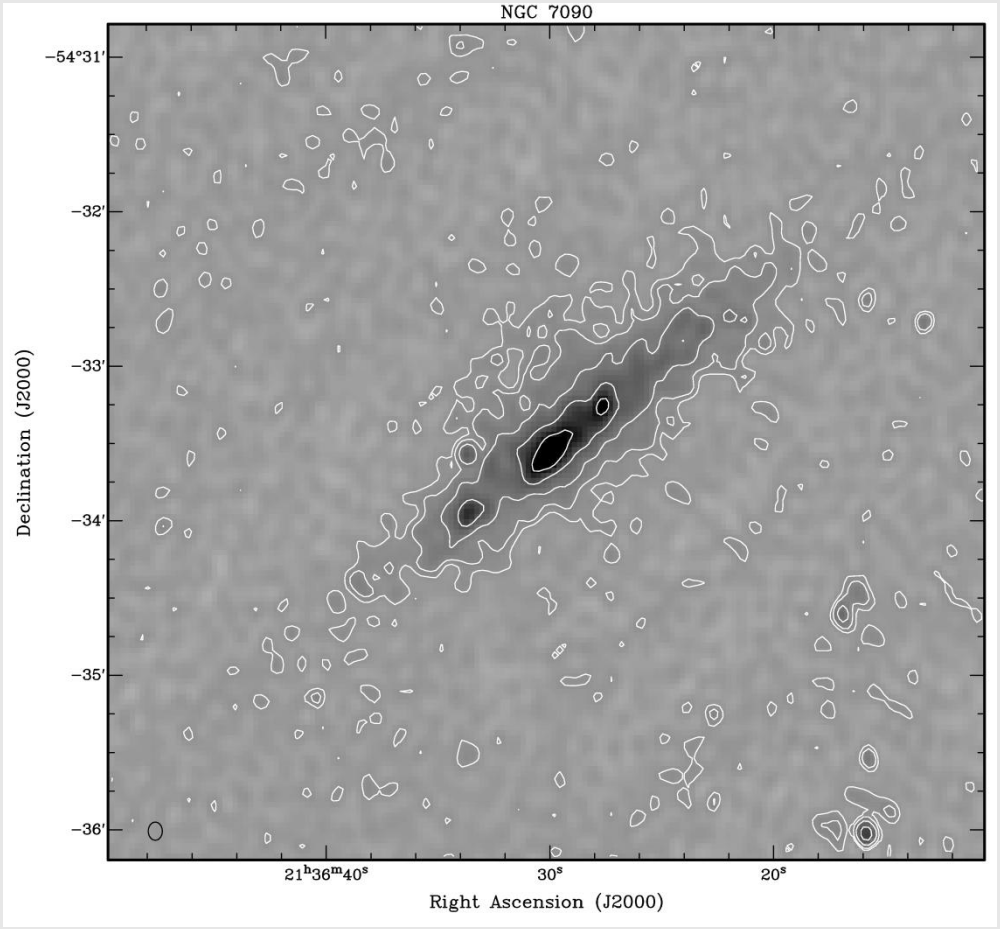
- Integrated fluxes
- Blue: gaussian fit
- Red: exponential fit with two components:
  - Scaleheights: 0.72 kpc & 0.16 kpc

First Results

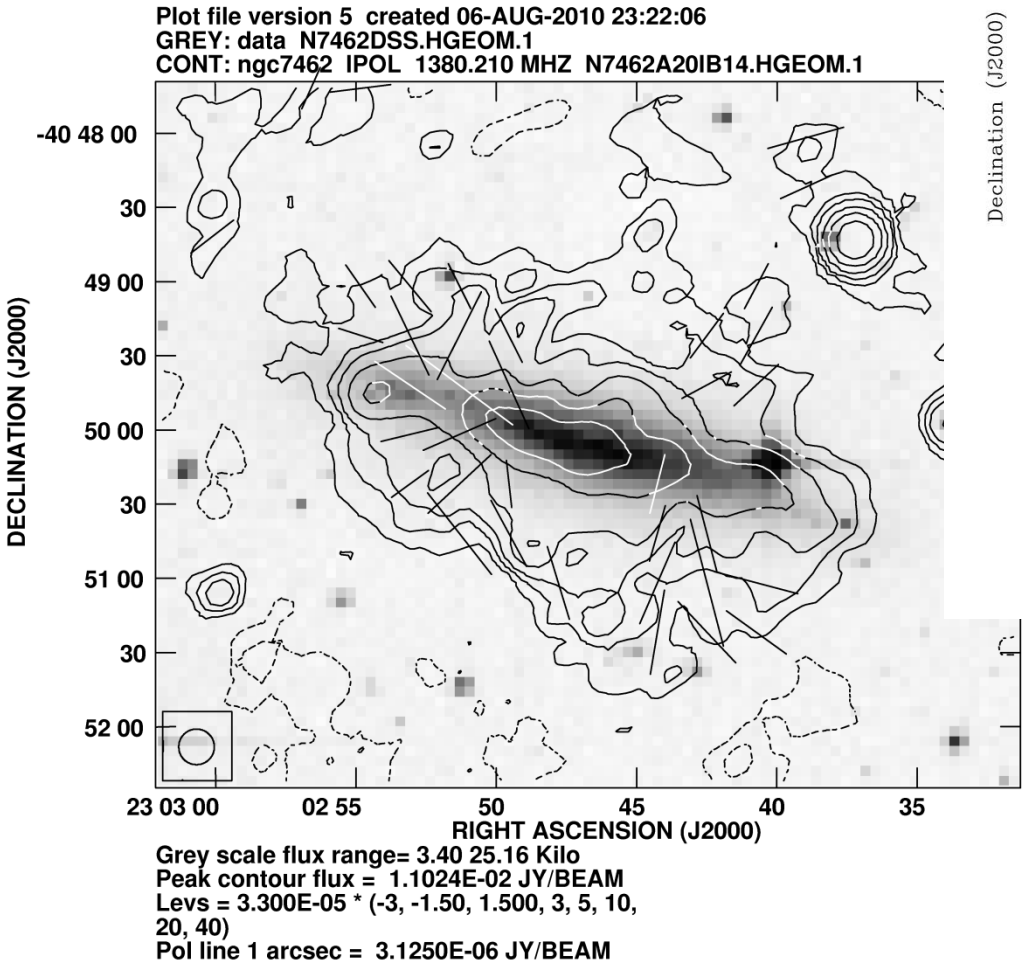


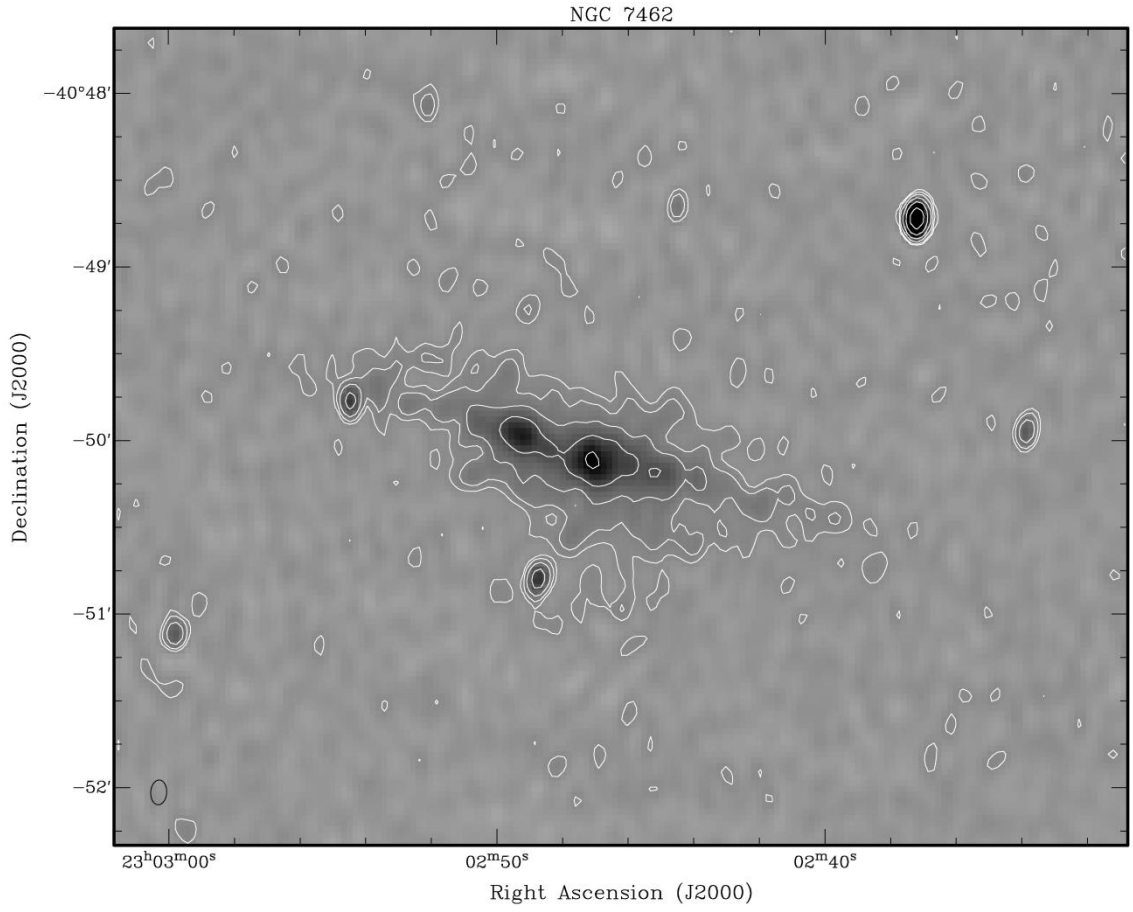
Future Work - Polarization





Future Work - Polarization





Future Work

- Polarization
- RM-Synthesis

→ First results show not as many polarization as thought

→ Convolving with a bigger beam

- Stripe integration
- Spectral index

Resume

→ Radio halos of NGC 7090 and NGC 7462 have to be further investigated