

# Experiment Radio astronomy

## Lab course protocol

Group 3+12

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# 1 Introduction

## 2 Theory

### 2.1 The Sun

### 2.2 The Milky Way

#### 2.2.1 Doppler Effect

#### 2.2.2 Milky Way Rotation

#### 2.2.3 Mass Estimate

## 3 Experiment

### 3.1 The Telescope

The radio telescope at Sand 1, Tübingen is a parabolic antenna with a diameter of 2.3 m. At the 21 cm Hydrogen line, it has a resolution of  $5^\circ$ . The telescope is controlled using the qradio software on a computer attached to it.

The telescope can either be operated as a bolometer (measuring the total power of radio signal) or as a spectrometer. For the first case, the measured signal is compared to the calibration source ('noise diode') located in the middle of the dish. For spectrometry, the power is measured together for the source and the background such that radio noise from human sources, sky emissions and the continuum emission of the source can be subtracted.

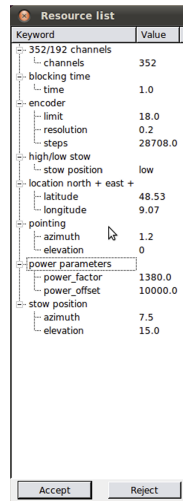


Figure 1: Radio telescope at Sand 1, Tübingen

The telescope is on a Alt-Az mount. Using the computer, the telescope can be moved by specifying galactic, equatorial and other coordinate systems.

## 3.2 Observations

To start the observations, first a restart of the computer is required. The program qradio is started with the following configurations:2



Keyword	Value
352/192 channels	
└ channels	352
└ blocking time	
└ time	1.0
└ encoder	
└ limit	18.0
└ resolution	0.2
└ steps	28708.0
└ high/low stow	
└ stow position	low
└ location north + east +	
└ latitude	48.53
└ longitude	9.07
└ pointing	
└ azimuth	1.2
└ elevation	0
└ power parameters	
└ power_factor	1380.0
└ power_offset	10000.0
└ stow position	
└ azimuth	7.5
└ elevation	15.0

Figure 2: qradio configuration. All the shown values much match

Now using the GUI, different parameters are set for the observations of the sun and the Milky Way.

### 3.2.1 Observation of the Sun

### 3.2.2 Observation of the Milky Way Disk

## 3.3 Data Analysis

# 4 Conclusions

# A Appendix