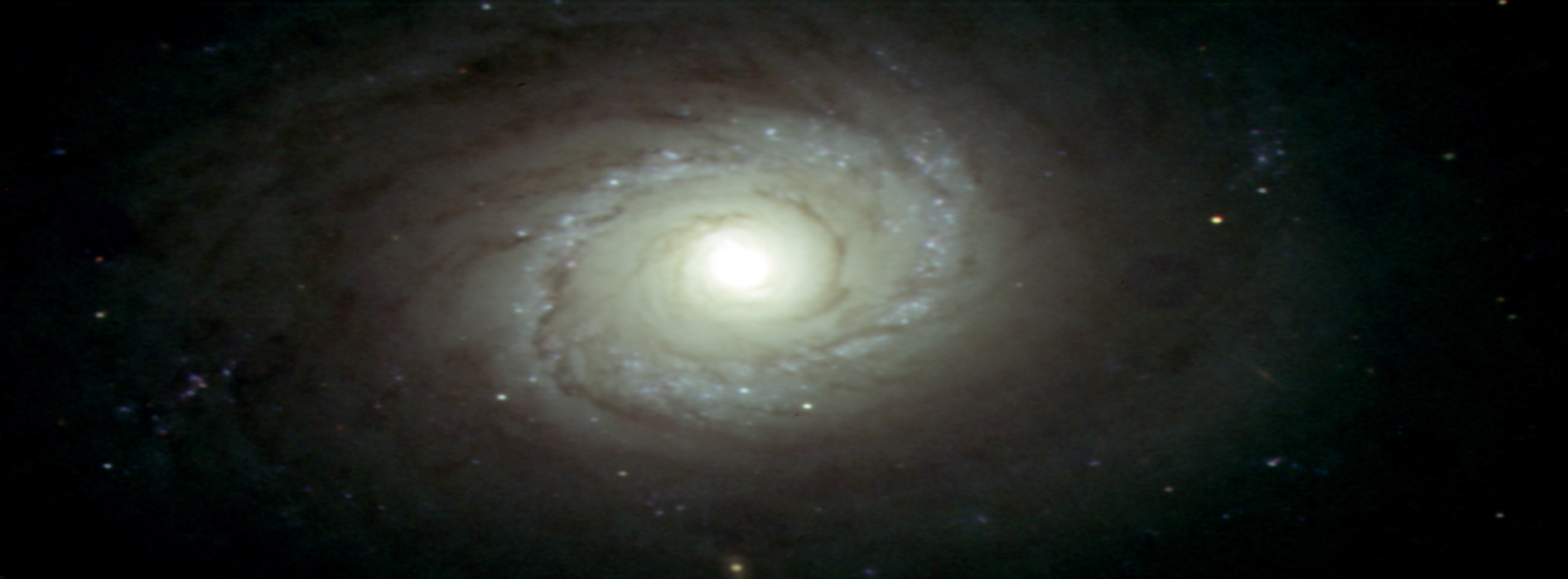


# Spectrographs and how to use them



25.7 2023

Ondřejov remote observing school

Raine Karjalainen

# Introduction

- Who am I?
- PhD –  
Planetary rings, dynamics and photometry  
Introduction to NOT family (background M94 BVR)
- NOT Staff Astronomer  
Responsibilities including organizing summer schools  
with remote (or local) observing
- ING Observing Support Scientist (read Support Astronomer)  
LIRIS, remote observing
- Interested in RVs, red giant star and their surroundings, observational astronomy





Spectrographs in general

FIES

How to plan observations and how to observe

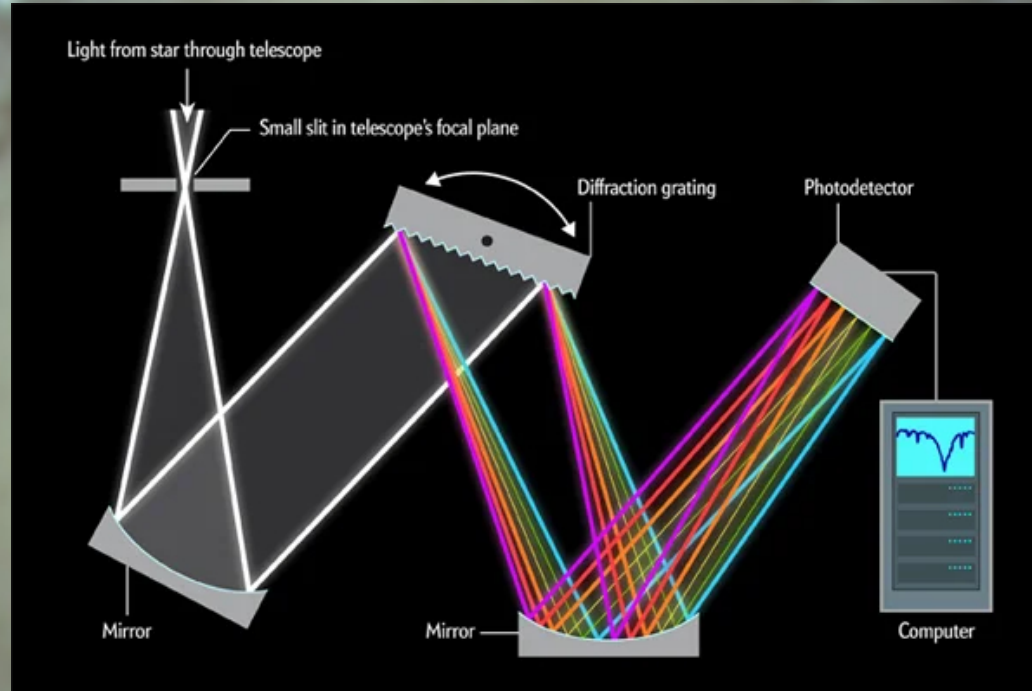
Data and data reduction

# What is a spectrograph?

Spectrograph splits light into different wavelengths

Slit  
Dispersing element  
Detector  
Collimator

Long-slit vs fibre  
-pros and cons

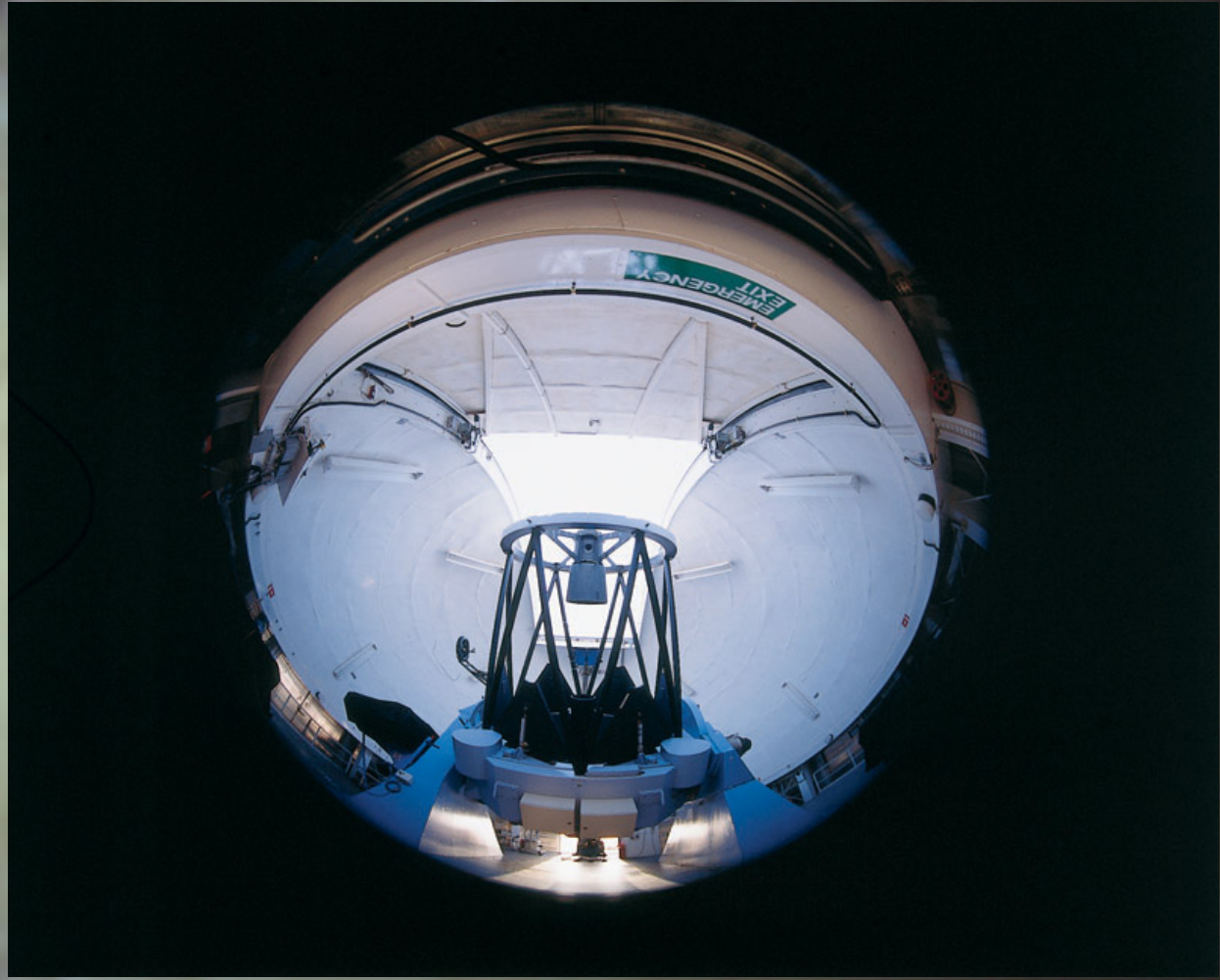


Disperser  
-grism, grating  
Cross-disperser  
Dichroic  
Iodine cell

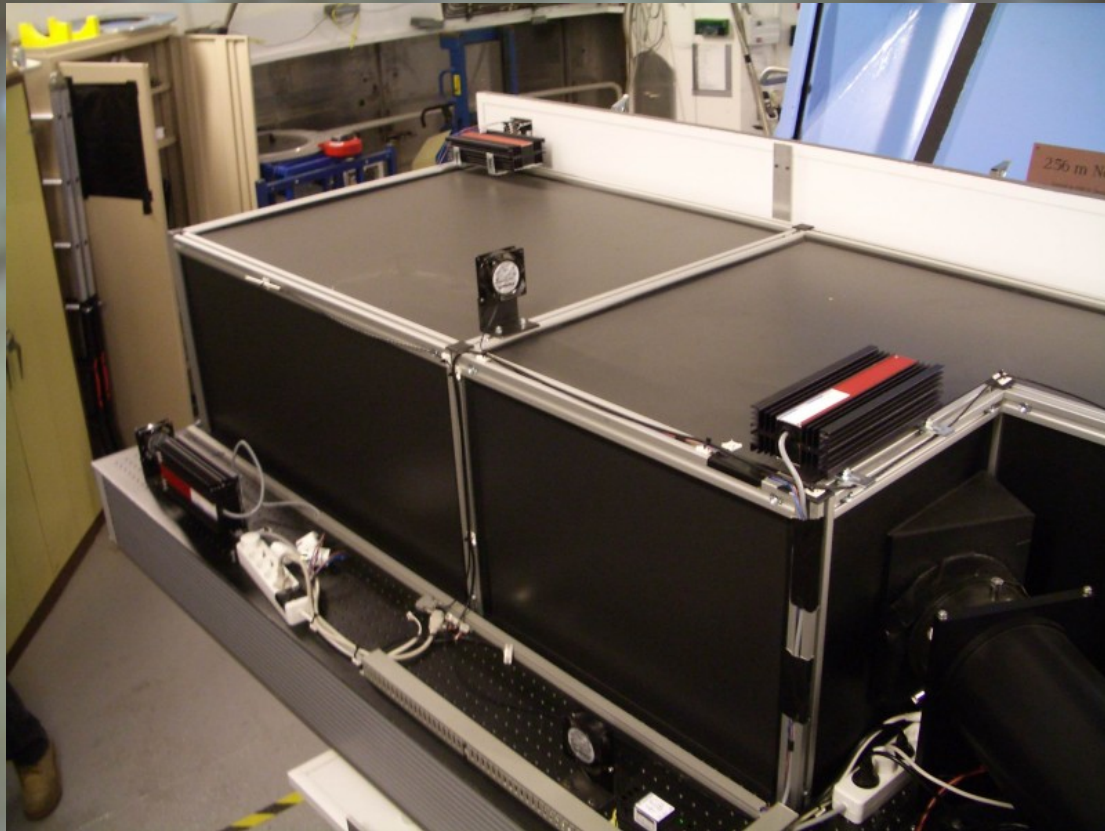
Characteristics  
-spectral range  
--central  $\lambda$   
-resolution  
FIES:  
R=67000, 370-830 nm



# FIES



# FIES

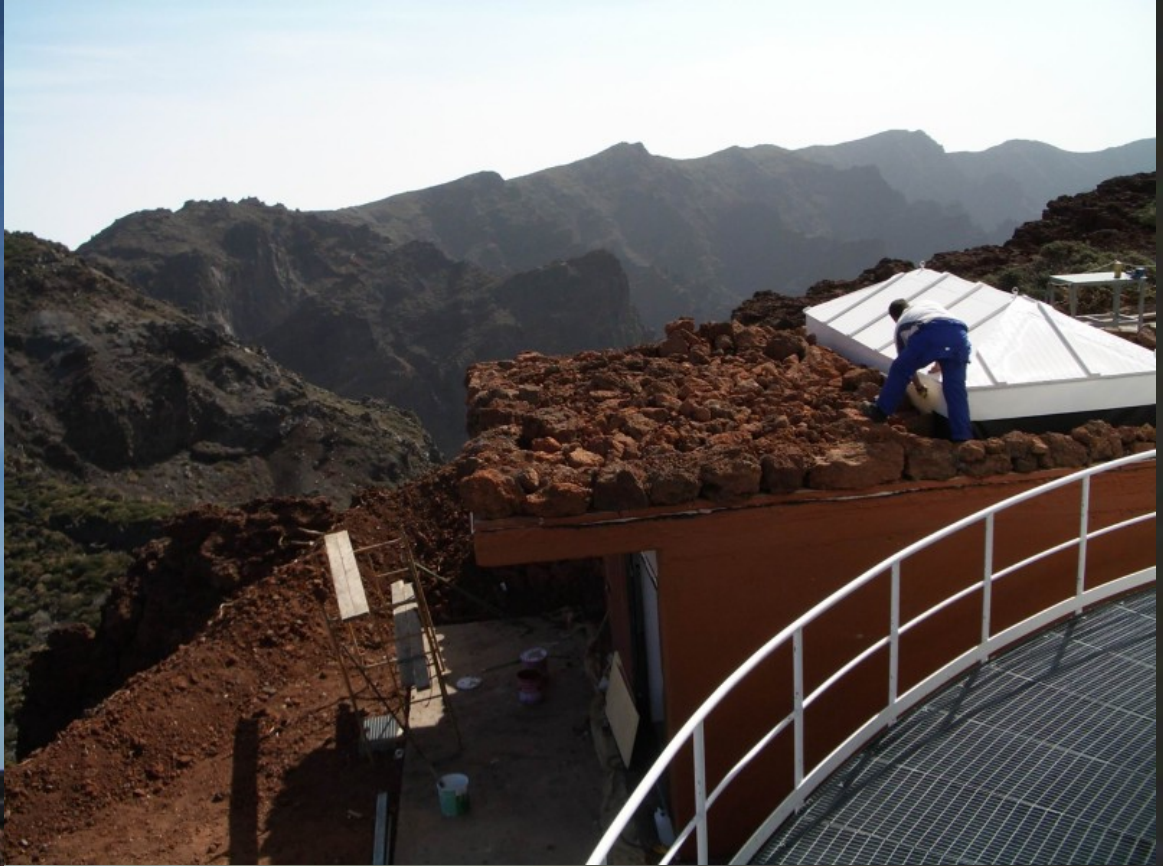


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FIES



# How to observe?

- Planning

Scientific idea

**ETC** (Exposure Time Calculator)

**visibility** *Kepler 19 22 40 +44 30 00*

**finding charts**

**Cookbook for observing with FIES**



# How to observe

## Calibrations

(in the afternoon and in the morning)

-Biases, flats, ThAr

- We use the script **fies-calibs**  
1 ThAr, 7 bias, 21 flats
- ThAr **atlas**

## Acquisition

move telescope to target field

take image of the field

put the star on the fibre

## Guiding

correcting tracking errors

## Exposing

# How to observe

- Standard stars: RV, spectrophotometric
- ThAr at before and/or after the science target?



# Data reduction

- FIEStool
- Ceres

At astro-ph

# FIES

Flat, raw image, not trimmed, not bias corrected



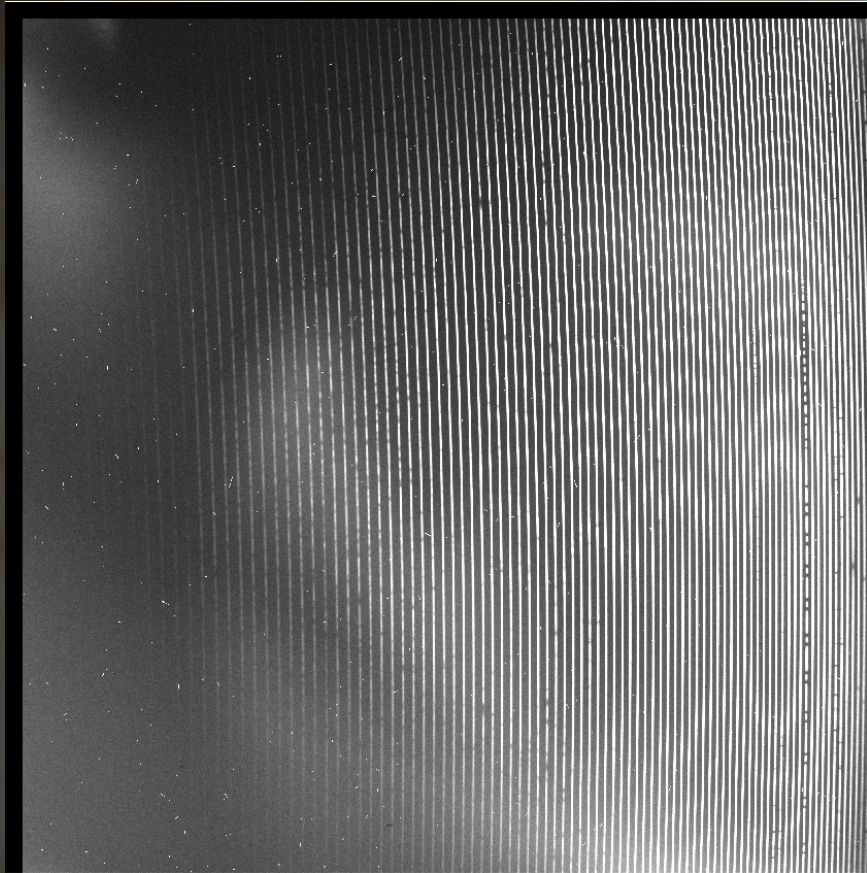
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# FIES

Raw science data, no trimming, no bias correction,  
no flat correction



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# Misc information

- Overrides
- Overheads
- ...
- Don't panic!
- Clear skies!