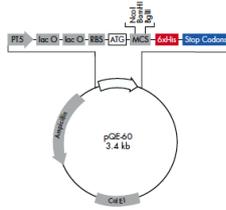


Prof. Dr. R.  
Ficner

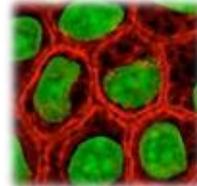
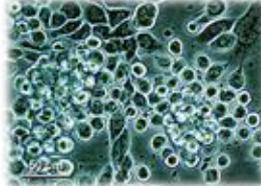
# Department of - Module - Structural Biochemistry

# How to get to pure protein/RNA

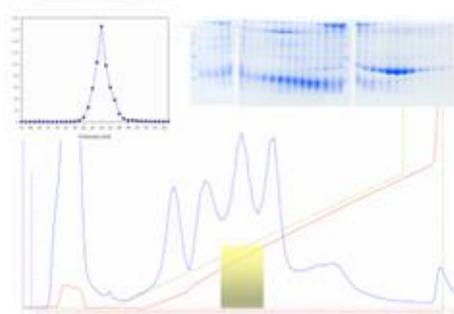
- Cloning



- Protein Expression & *in vitro* RNA synthesis



- Purification



# Properties of molecules

## Biophysical Methods

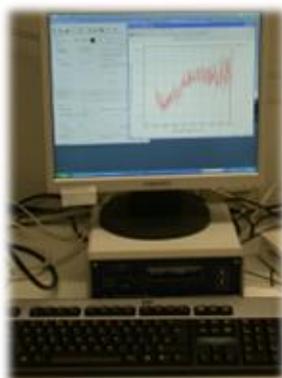
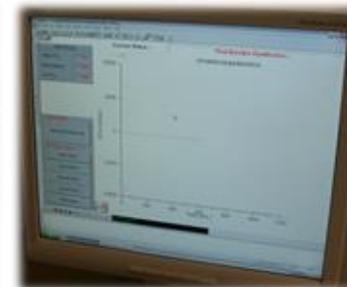
Thermal Shift Assay

Dynamic Light Scattering

Isothermal Titration Calorimetry

Spectroscopic Binding Studies

- Fluorescence
- Circular dichroism
- Fluorescence polarisation



sample preparation  
and characterisation

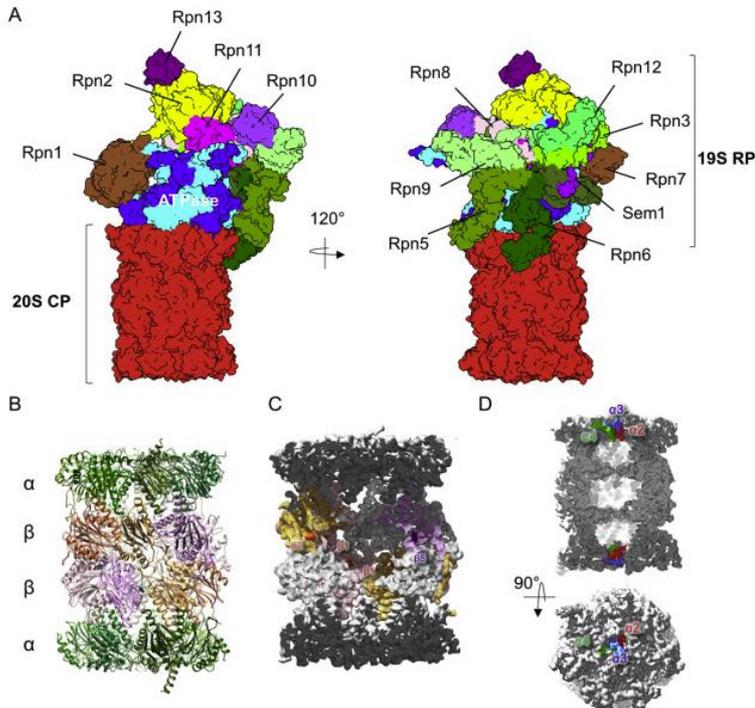
# Projects in the labs



**Dr. Eri Sakata**

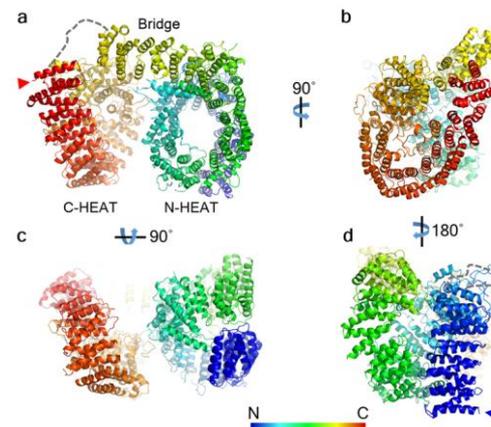
Institute for Auditory Neuroscience  
University Medical Center Göttingen

Proteasome, AAA<sup>+</sup> Proteases  
**conformational dynamics**

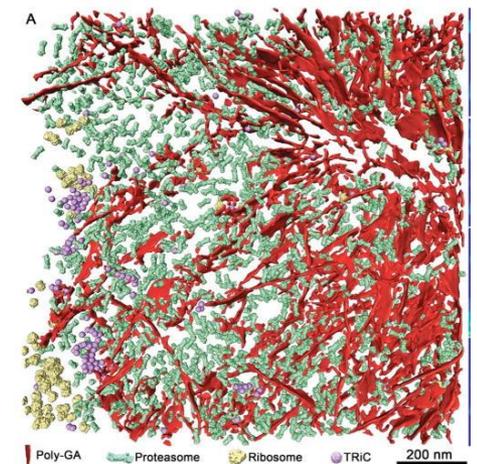


**Prof. Dr. Rubén Fernández-Busnadiego**  
Institute for Neuropathology University  
Medical Center Göttingen

**molecular architecture of neurons**  
membrane contact sites (MCS)



**protein aggregation**



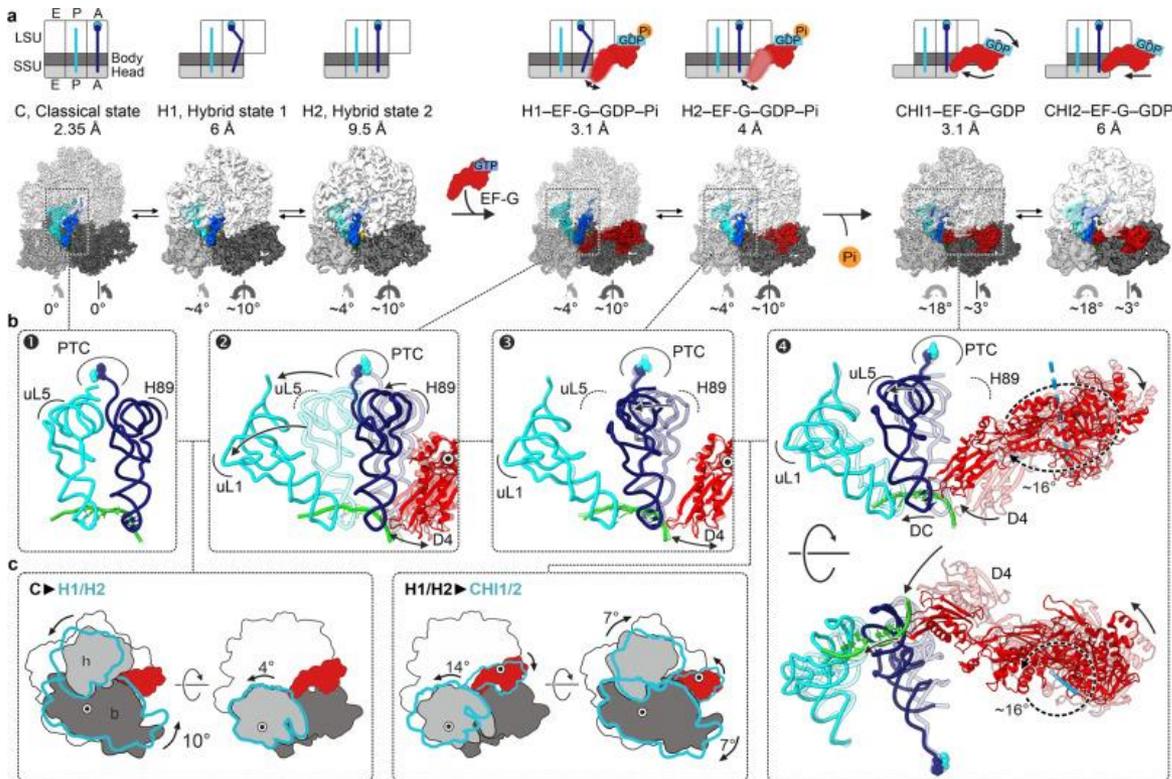
neuronal C9orf72 poly-GA aggregates

# Projects in the labs



**Dr. Niels Fischer (MPI-BPC)**  
Abteilung Physikalische Biochemie  
(Marina Rodnina)

## Ribosome function



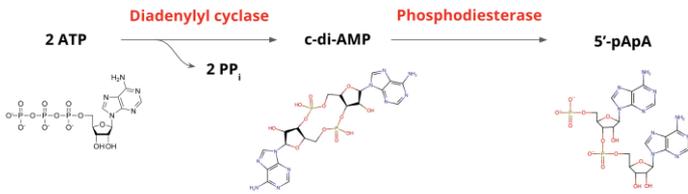
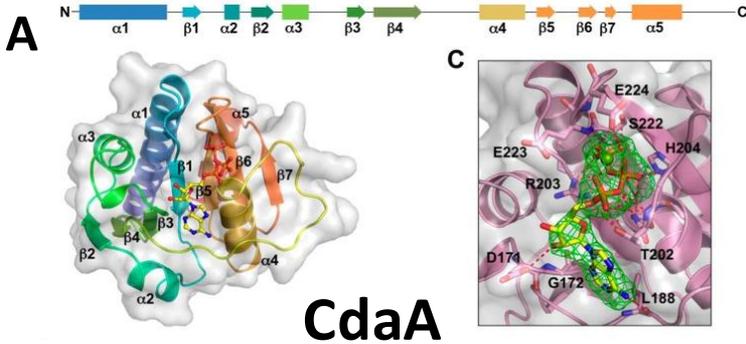


# Projects in the labs

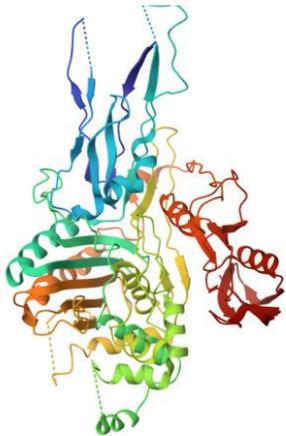


## 1. Drug design

## 2. Basic understanding of N-C transport

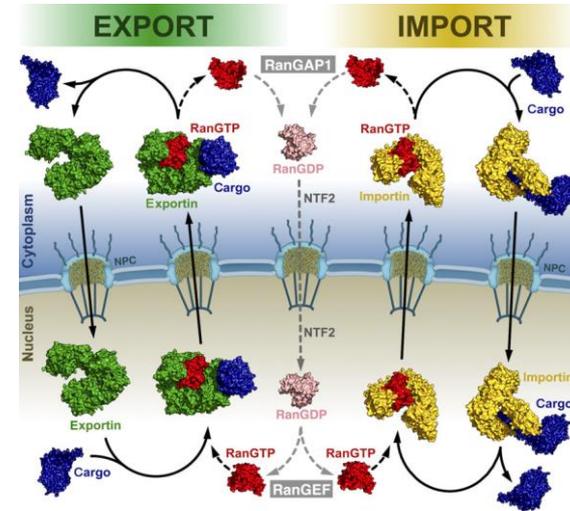


**B**

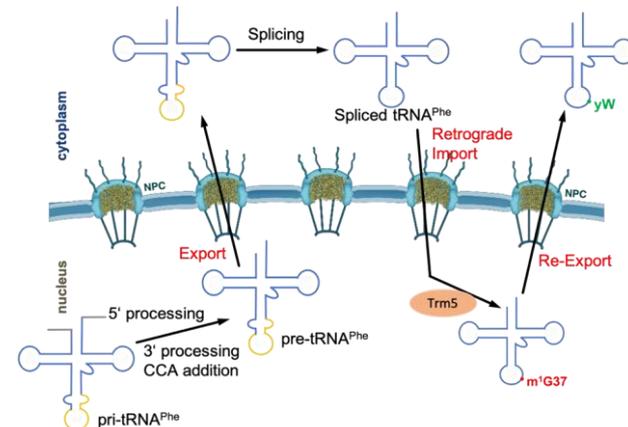


**beta -  
Lactamases,  
Penicillin Binding  
Protein**

**A**



## B Constitutive retrograde import of tRNA<sup>Phe</sup>

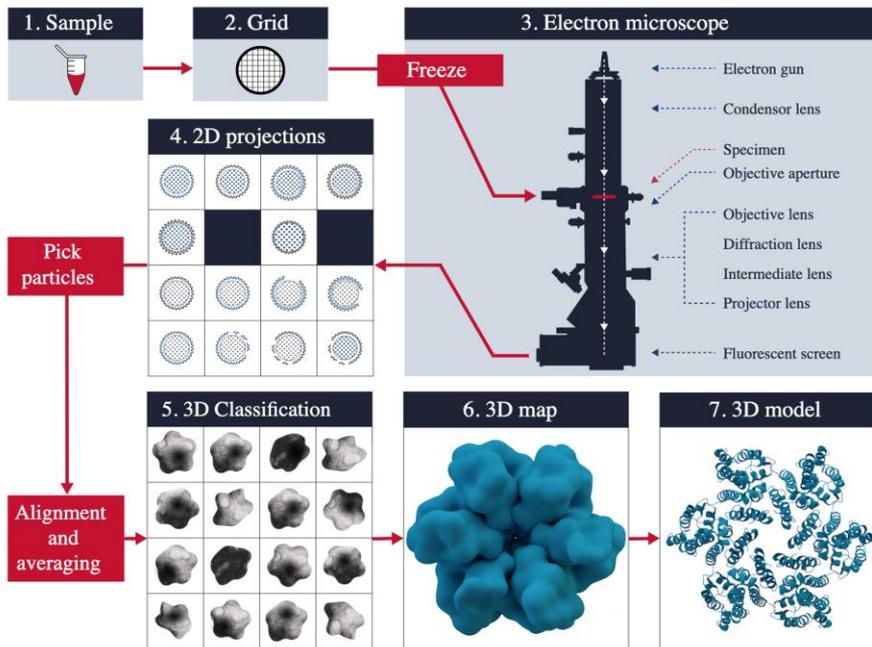
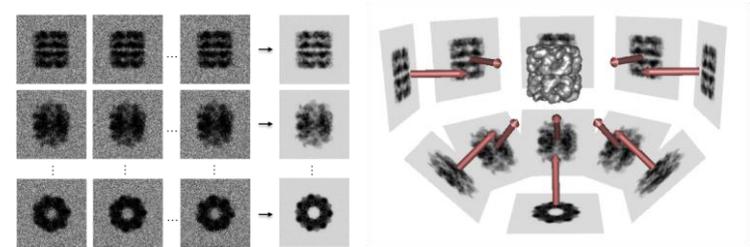


## C Stress-induced retrograde import of tRNAs

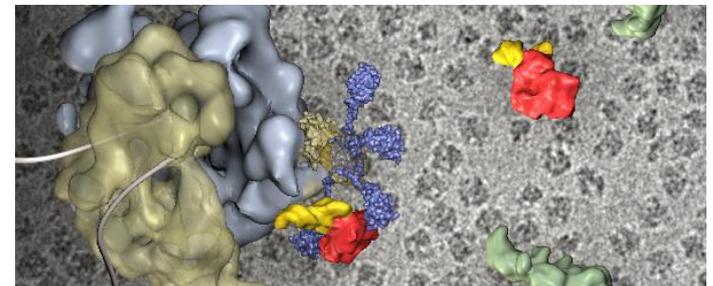
# Electron Microscopy

single particle  
detection

# Electron Tomography

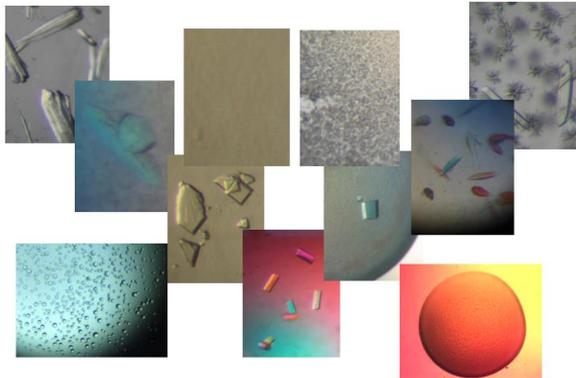
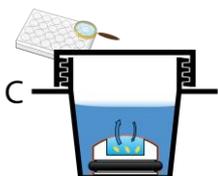
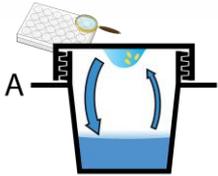


Data collection  
computational analysis  
and  
structure determination



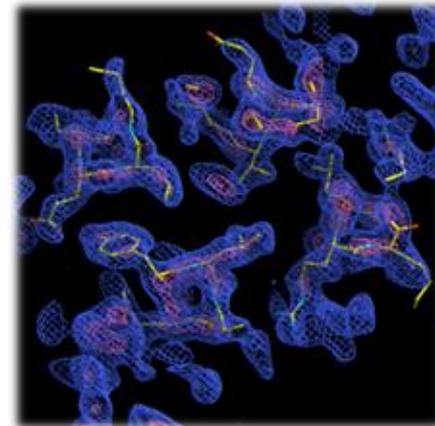
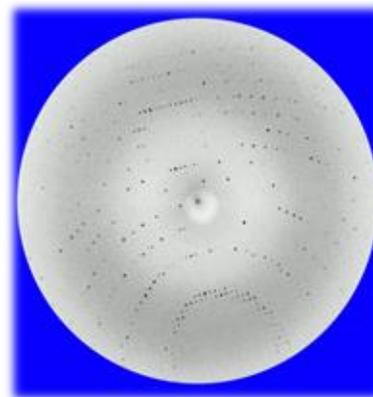
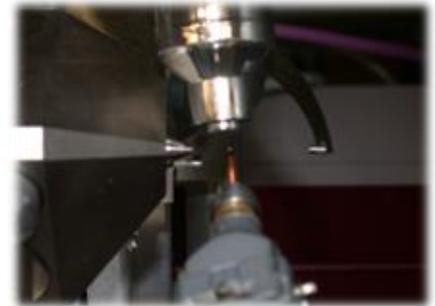
# X-tal

## Crystallization



# X-Ray Crystallography

Data collection  
computational analysis  
and  
structure determination



# Courses; Advanced Modules

## Fachmodul

M.Bio 106 Lecture, Seminar, Methods Course

## Schlüsselkompetenzmodule

M.Bio.156 Strukturbiochemie

**M.Bio.166 Methodenkurs: Strukturbiochemie**

M.Bio.176 Structural Biochemistry VL+/-Sem

**-> Sommersemester**

**Advanced Modules: M.Bio 116/126**

**-> Summer- and Beginning of Wintersemester**

# Modul M.Bio.106: Structural Biochemistry

## Subjects of Lecture

- **Methods in Structural Biology**

  - X-ray crystallography

  - cryogenic Electron Microscopy

  - Small Angle X-ray Scattering

  - Single molecule techniques (FEL)

  - NMR spectroscopy

  - Computational Methods (aaMD, Robetta ...)

  - Förster resonance energy transfer (FRET)

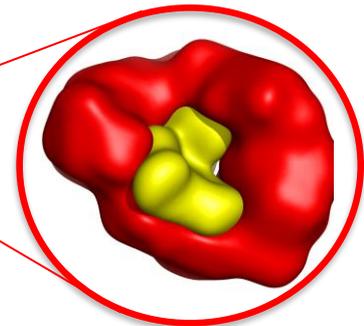
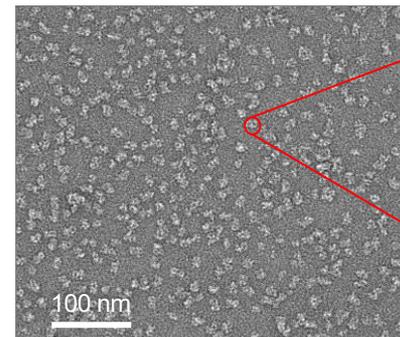
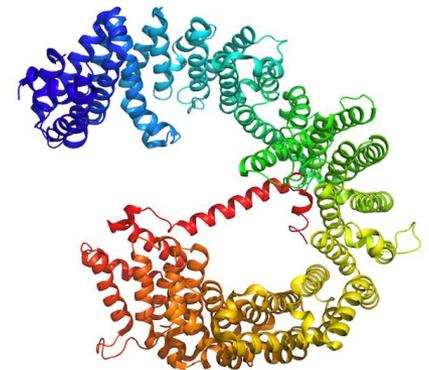
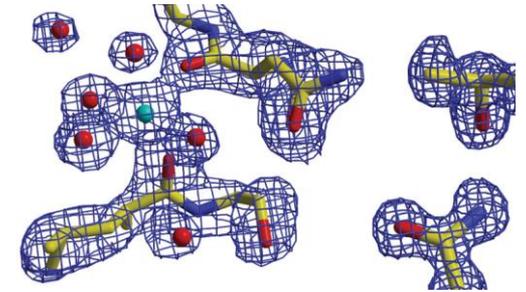
- **Structure-function relationship**

  - Protein-Protein interaction

  - Protein-RNA/DNA recognition

  - Catalytic mechanisms of enzymes

- **Structure-based drug design**



# Methods Course

## Schedule:

Date	Course instructor	Room Sem./Work	Program
<b>June 2026</b>			
Mon, June 15	N. Fischer	CIP/CIP	EM-Structure Determination
Tue, June 16	N. Fischer	CIP/CIP	EM-Structure Determination
Wed, June 17	P. Neumann	CIP/CIP	The PDB, Pymol, CCP4
Thu, June 18	P. Neumann	CIP/CIP	Pymol, CCP4 - electron density map calculation
Fri, June 19	P. Neumann	CIP/CIP	Molecular replacement (solving the structure of insulin), refinement, model rebuilding
<b>20/21</b>			
Mon, June 22	P. Neumann	CIP/CIP	Refinement, model rebuilding (MB) and validation (insulin), omit map calculations, Pymol (figures, electron density maps).
Tue, June 23	P. Neumann	CIP/CIP	Molecular replacement, MB and refinement (RNASE), Pymol
Wed, June 24	P. Neumann	CIP/CIP	Molecular replacement, model building and refinement, Pymol
Thu, June 25	P. Neumann	CIP/CIP	Practical examination (MR, Refmac5, Pymol)
Fri, June 26	A. Dickmanns P. Neumann	CIP/CIP	S1 Safety lecture Structure prediction (Rosetta)
<b>27/28</b>	<b>Block A</b>		
Mon, June 29	A. Dickmanns	PR	Introduction, Intro Lab-experiment, Purification GST-Trap, Plasmid-Digest Heparin, RNA-Transcription, SEC, RNA-Purification, Crystallization, EMSA, DLS
Tue, June, 30	A. Dickmanns	PR	
Wed, July 01	A. Dickmanns	PR	
Thu, July 02	A. Dickmanns	PR	
Fri, July 03	A. Dickmanns	PR	
<b>04/05</b>	<b>Block B</b>		
Mon, July 06	A. Dickmanns	PR	Introduction, Intro Lab-experiment, Purification GST-Trap, Plasmid-Digest Heparin, RNA-Transcription, SEC, RNA-Purification, Crystallization, EMSA, DLS
Tue, July 07	A. Dickmanns	PR	
Wed, July 08	A. Dickmanns	PR	
Thu, July 09	A. Dickmanns	PR	
Fri, July 10	A. Dickmanns	PR	



Niels Fischer (EM)



Piotr Neumann



**BLOCK A: 29. June-3. July**  
**BLOCK B: 6.-10. July**

## Exams 2025

Wednesday	05.08.2025	10:00–12:00
Wednesday	23.09.2025	10:00–12:00

# Questions?

**Achim Dickmanns**

**[adickma@gwdg.de](mailto:adickma@gwdg.de)**

Tel: (39-) 28620