

2 / 1

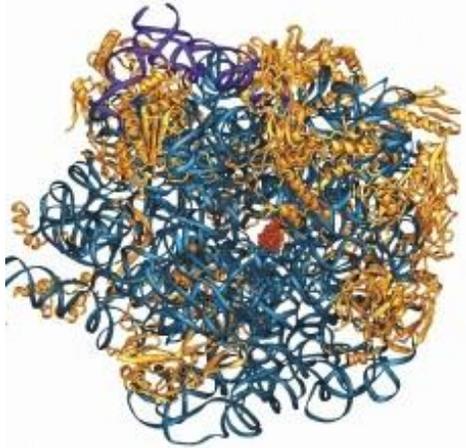
## Kristallstrukturbestimmung

Beispiel:

Bestimmung der Struktur von Ribosomen mittels Röntgenbeugung

Ada Jonath, Venkatraman Ramakrishnan und Thomas Steitz

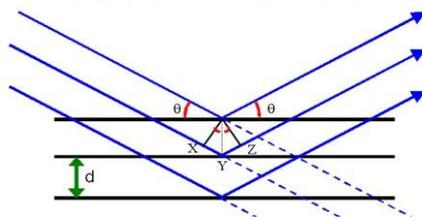
(Nobelpreis für Chemie 2009)



[http://desy.de/research/photon\\_science/nobel\\_prize/index\\_eng.html](http://desy.de/research/photon_science/nobel_prize/index_eng.html)

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## Bragg-Reflexion



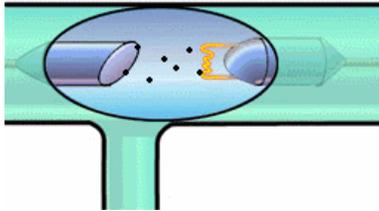
$$n \lambda = 2 d \sin \theta$$

Röntgendiffraktometer

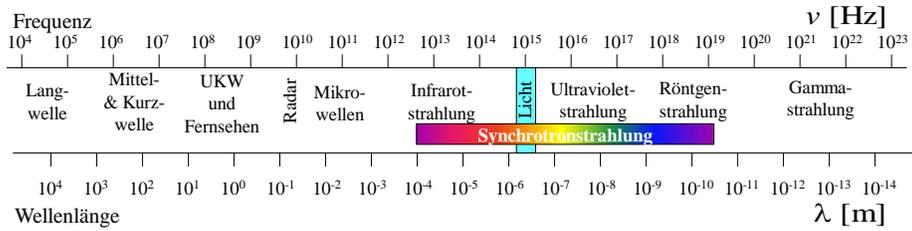
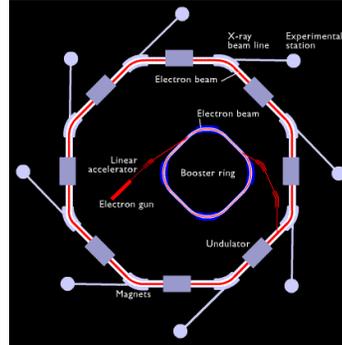


## 2 / 3 Erzeugung von Röntgenstrahlung

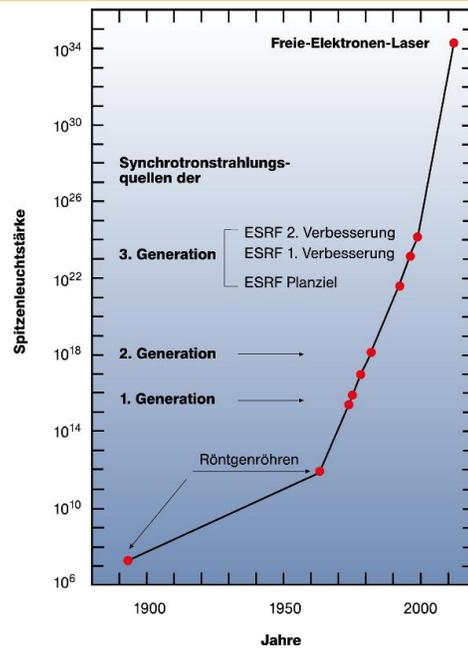
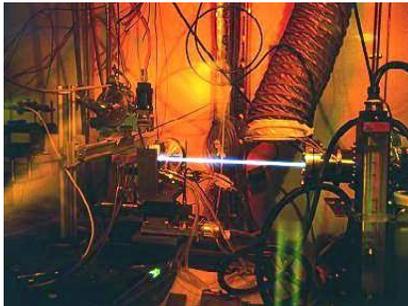
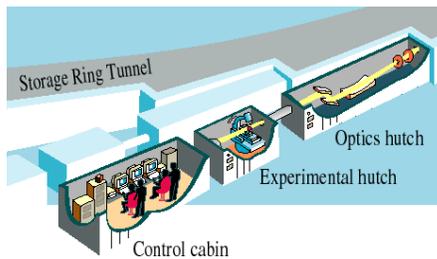
..... durch abgebremste Elektronen  
→ Röntgenröhre (1895)



..... durch beschleunigte Elektronen  
→ Elektronen-Synchrotron (1947)



## 2 / 4 Synchrotronstrahlung



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## Synchrotronquellen international



European Synchrotron Radiation Facility,  
Grenoble (Frankreich):  
E = 6 GeV, U = 844 m

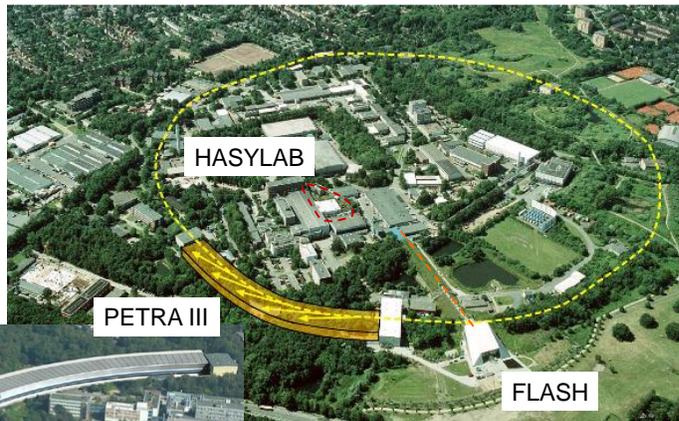


APS,  
Argonne, Chicago  
E = 7 GeV, U = 1104 m



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## Synchrotronquellen Hamburg

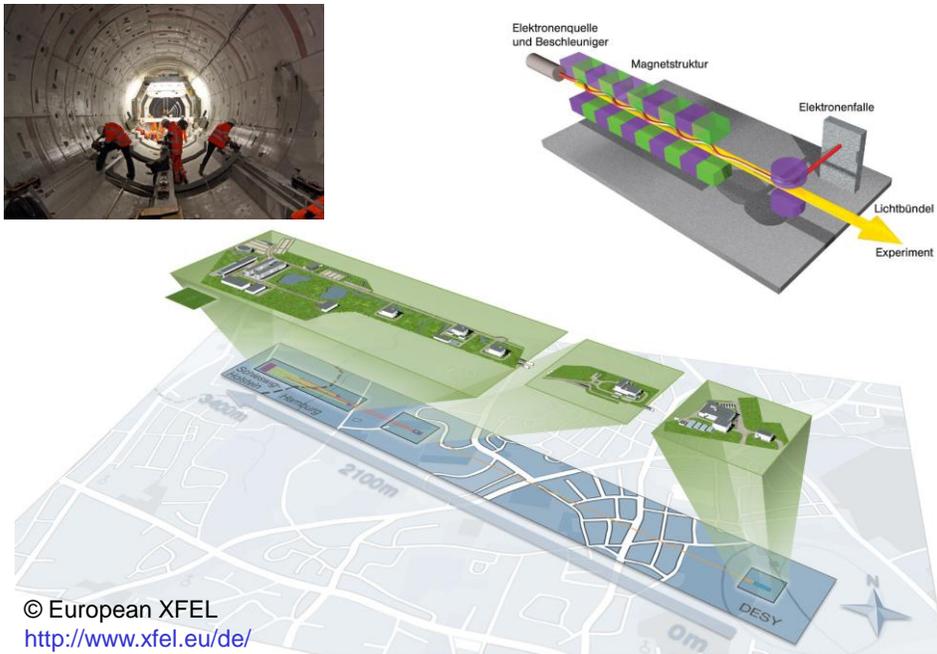


PETRA III (seit 2009)  
E = 6 GeV, U = 2300 m

<http://hasylab.desy.de/>

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## Röntgen-Freie-Elektronen-Laser XFEL Hamburg

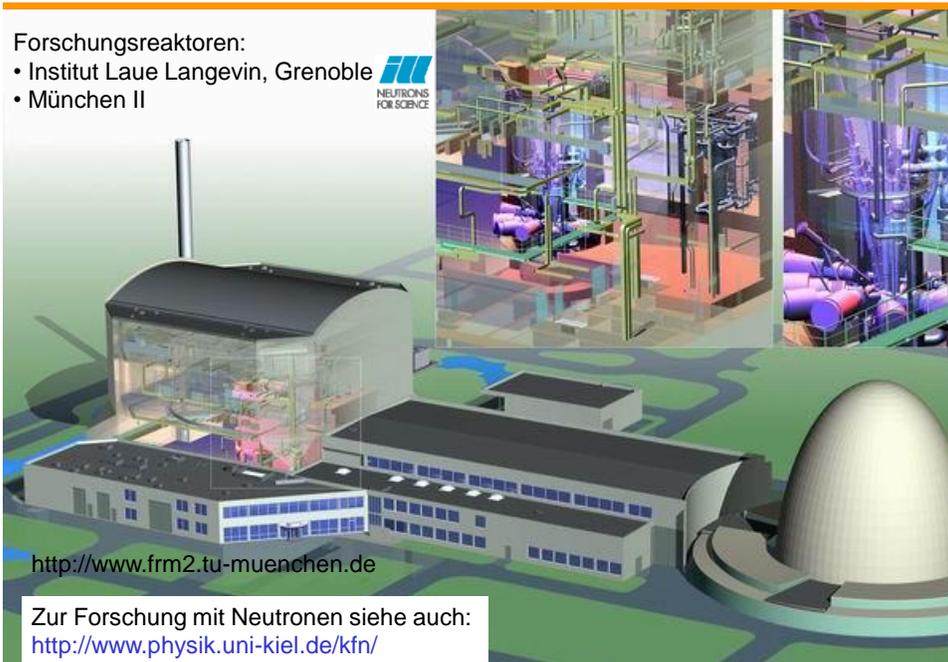


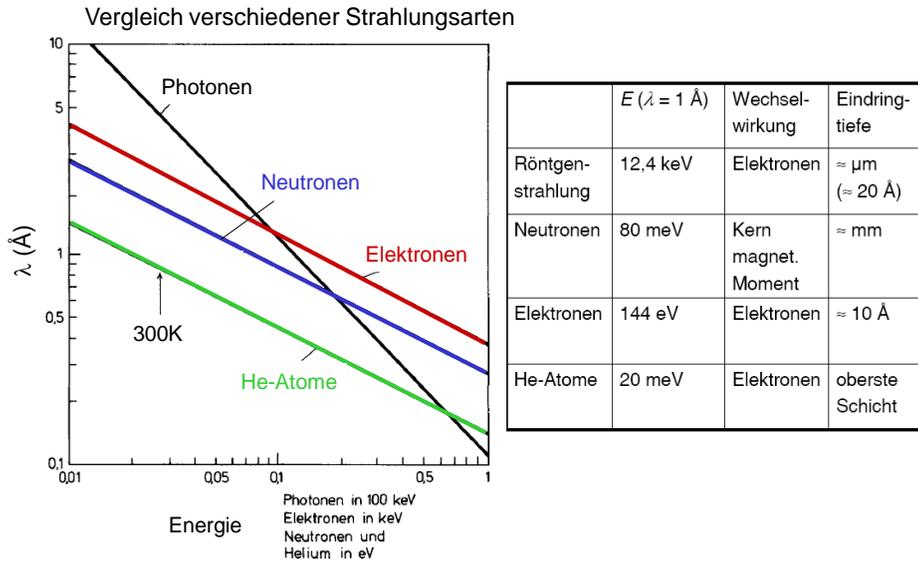
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## Neutronenquellen

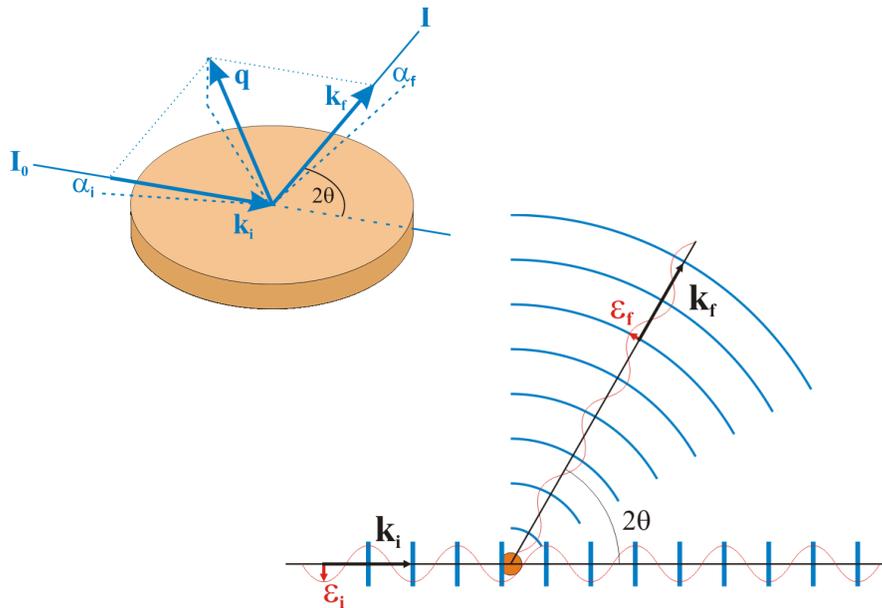
Forschungsreaktoren:

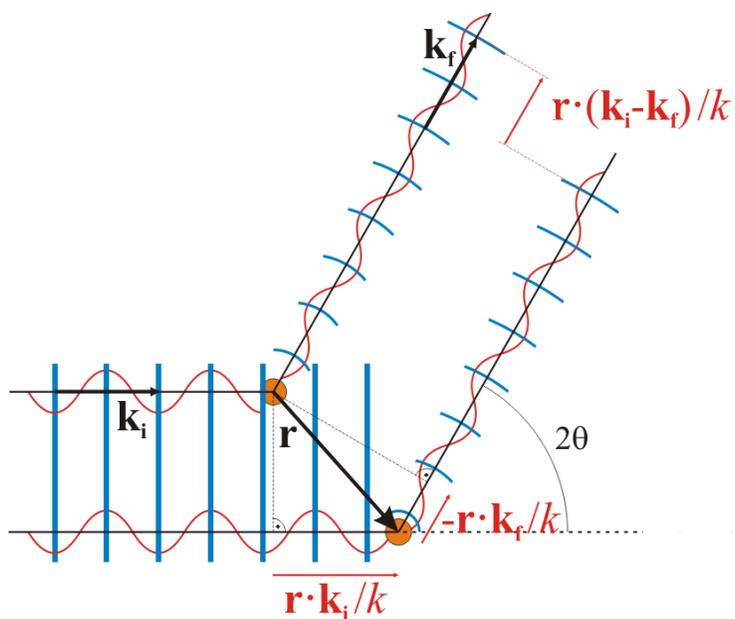
- Institut Laue Langevin, Grenoble
- München II



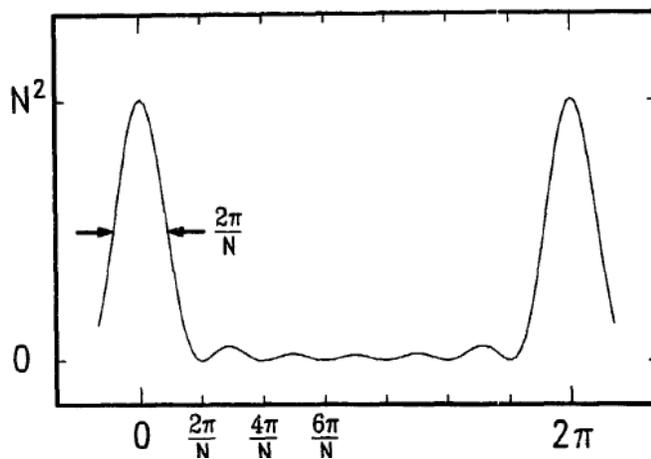


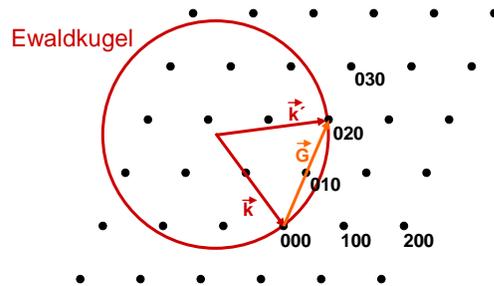
Nach Ibach/Lüth, 6. Aufl., S. 67





Beugung am N-fachen Mehrfachspalt





Animation:

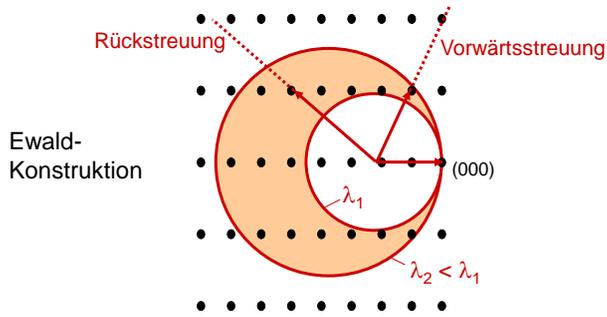
[http://www.upf.pf/~guarino/virt\\_lab/cristallo/ewald.html](http://www.upf.pf/~guarino/virt_lab/cristallo/ewald.html)

Strukturfaktoren der Reflexe im kubischen System

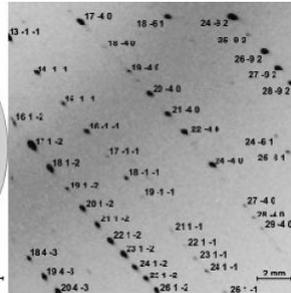
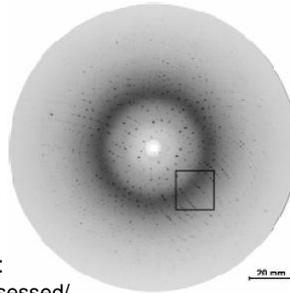
hkl	sc	bcc	fcc
100	f	0	0
110	f	2f	0
111	f	0	4f
200	f	2f	4f
210	f	0	0
211	f	2f	0
220	f	0	4f

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## Laue-Diffraktion



Modernes Beispiel:  
zeitaufgelöste Messungen  
(150 ps, ESRF / ID09)

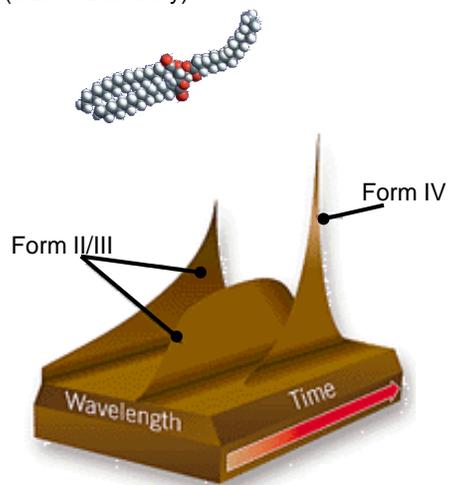
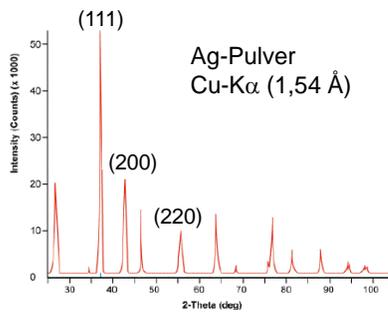


Mehr zu Proteinkristallographie:  
<http://www.thirteen.org/naturally-obsessed/>

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## Pulverdiffraktogramm

Modernes Beispiel:  
Strukturveränderungen von Kakaofett in  
Schokolade während Abkühlen und Rühren  
(SERC Darsbury)



4-Kreis Diffraktometer mit Eulerwiege

