



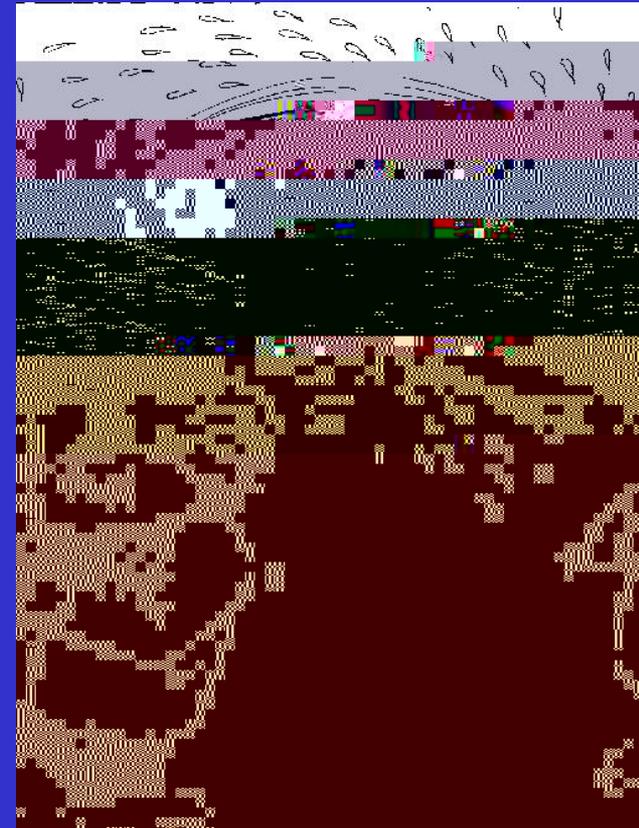
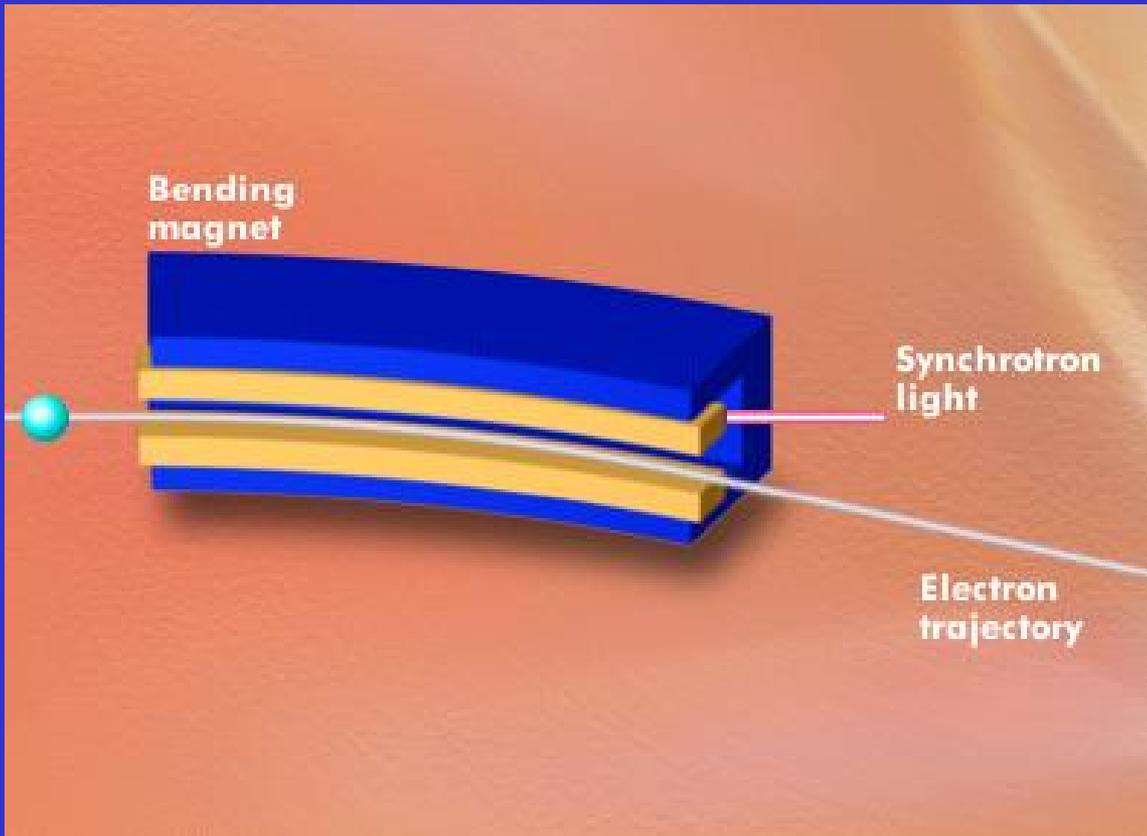
2009/3/26

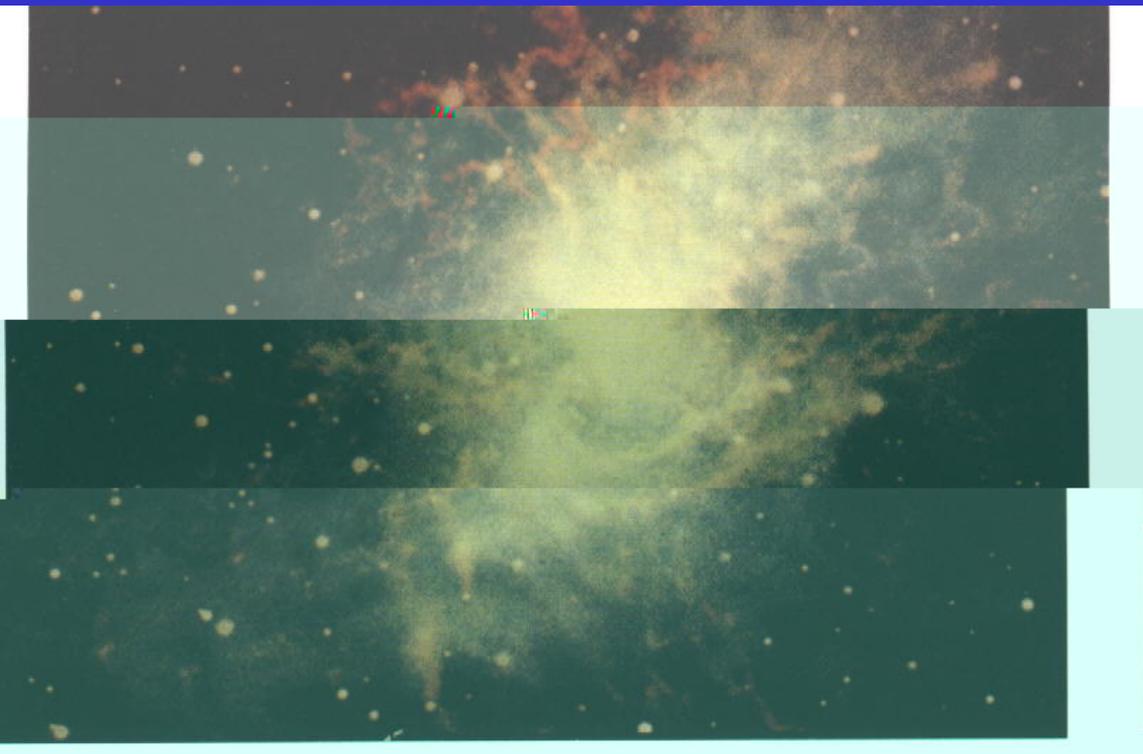






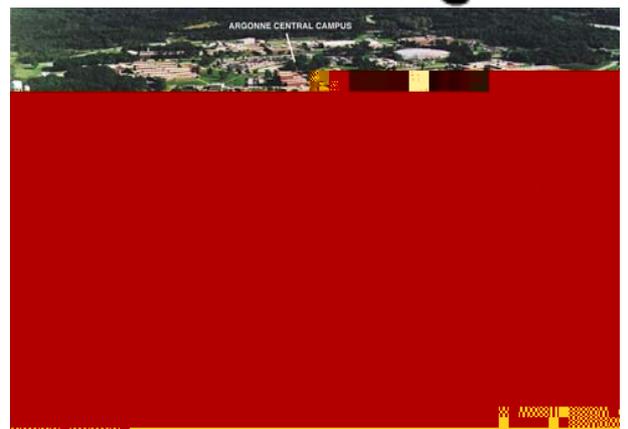
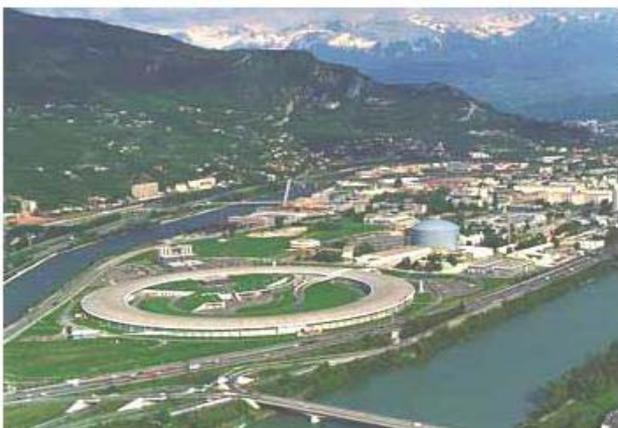
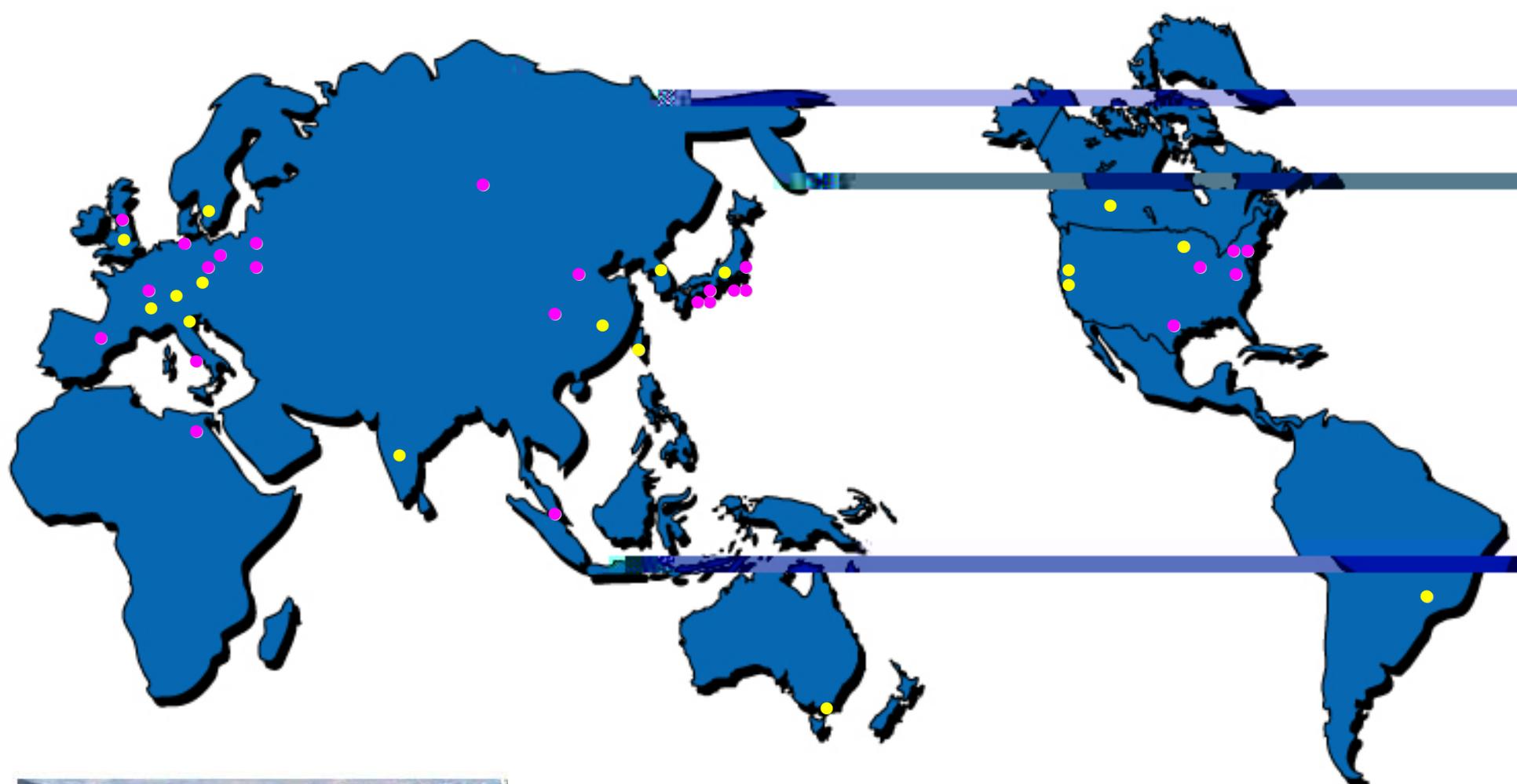
Members of the Manhattan Project  
at the first demonstration in 1941





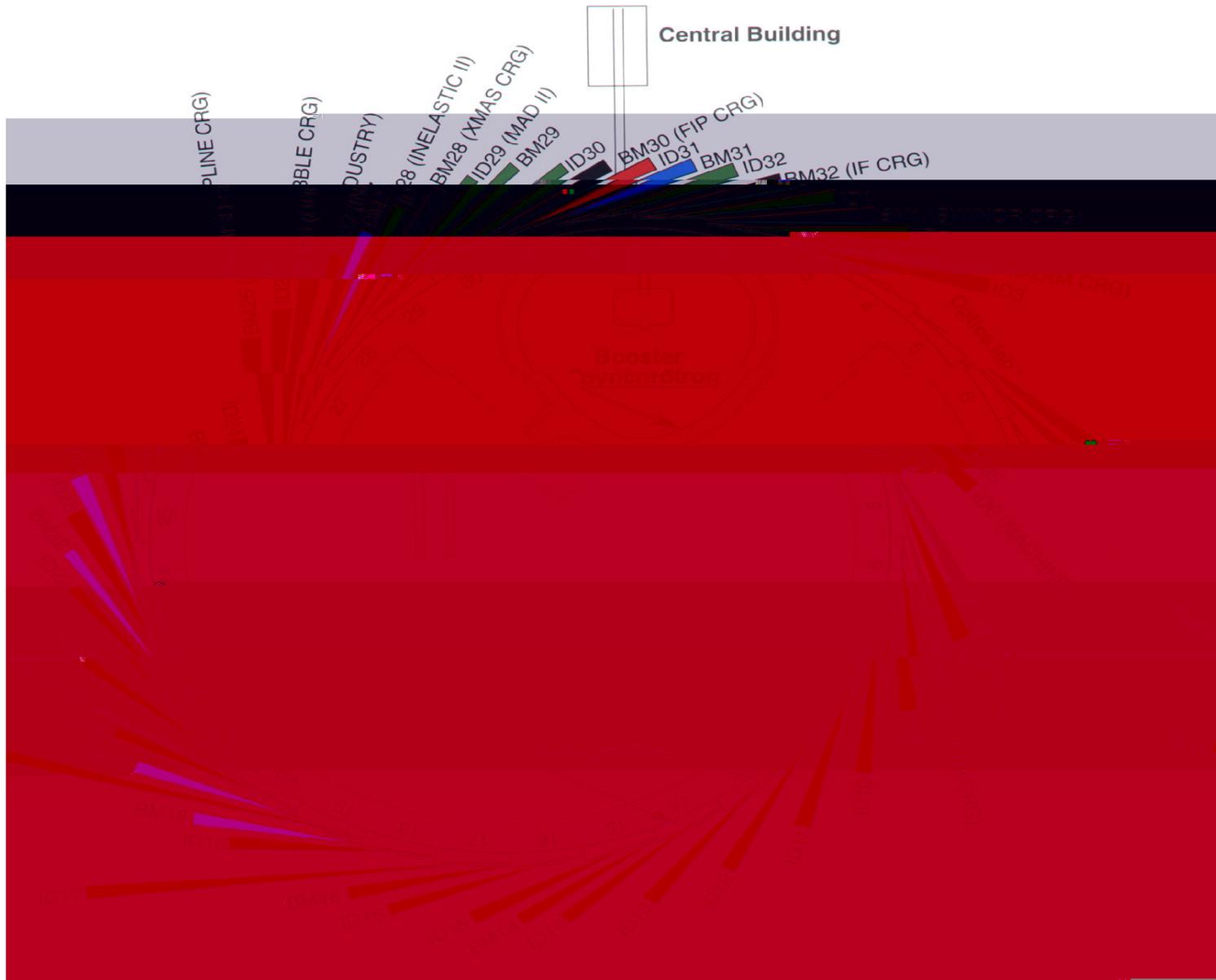
太白	和元	月司	容百	不犯	有光	仕揚	至和		
角	五	星	官	畢	路	進	元		
四	月	星	星	宿	星	星	星		
出	晨	容	品	者	經	星	星		
之	也	星	是	三	星	星	星		
白	方	女	宿	宿	宿	宿	宿		
凡	中	火	大	大	大	大	大		
兄	天	北	贊	贊	贊	贊	贊		
一	閏	也	元	元	元	元	元		
十	五	初	年	年	年	年	年		
三	日	生	三	三	三	三	三		
日		如							



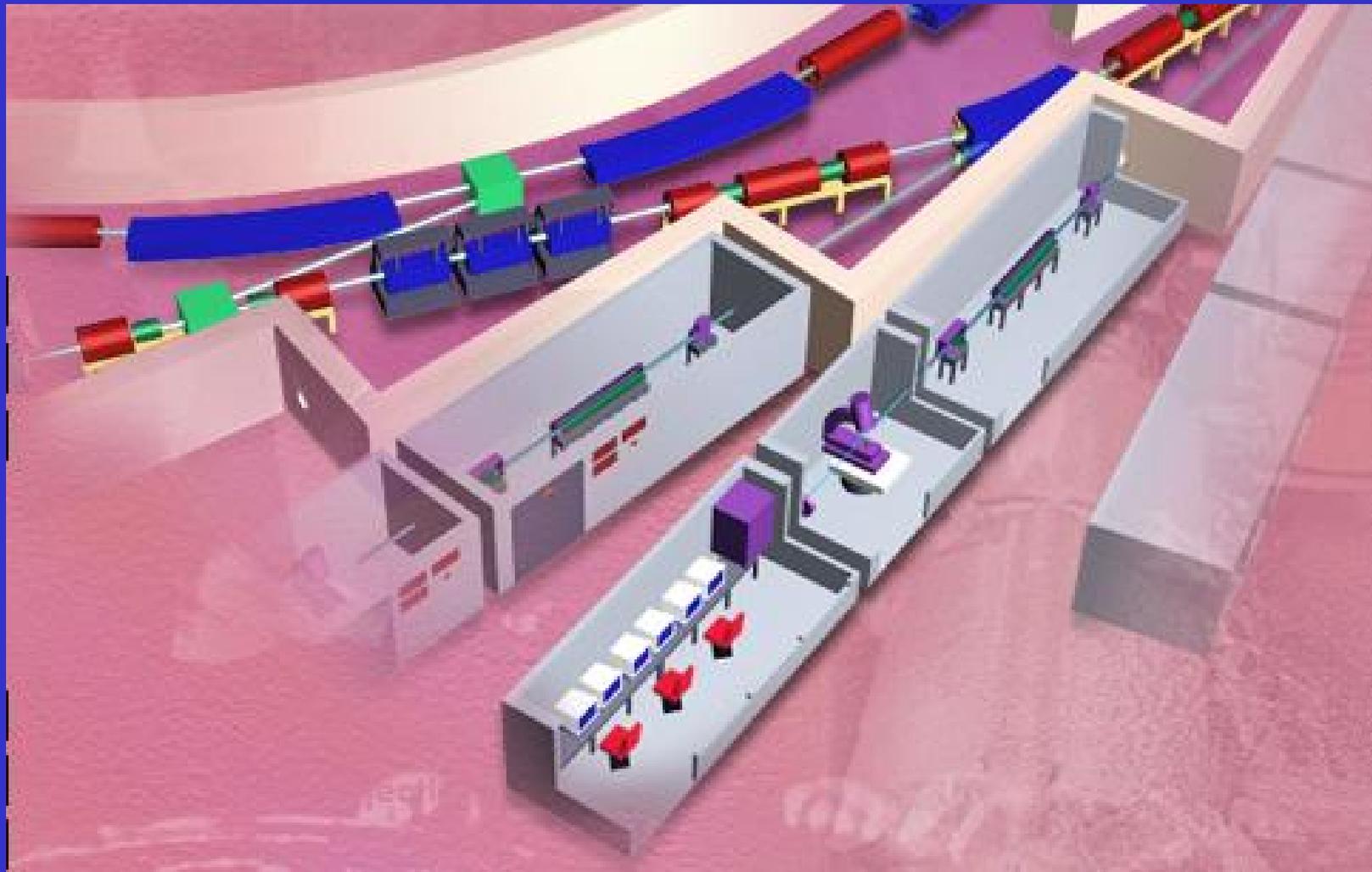


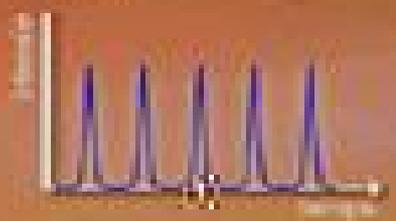
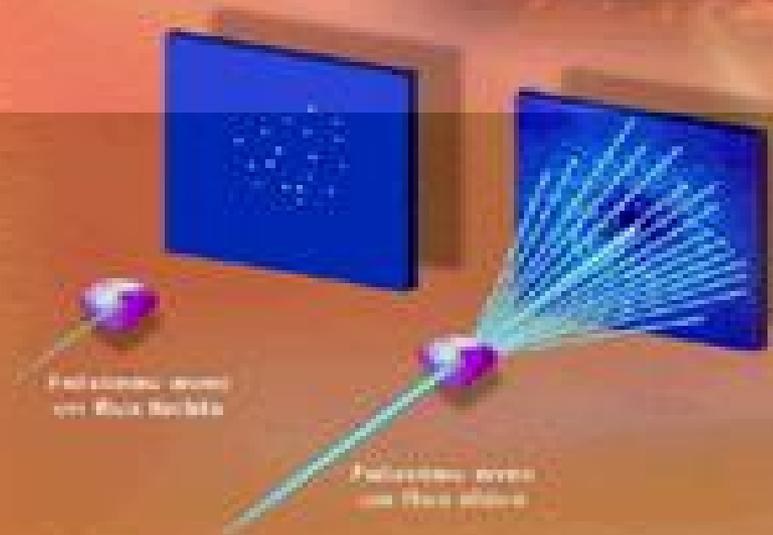
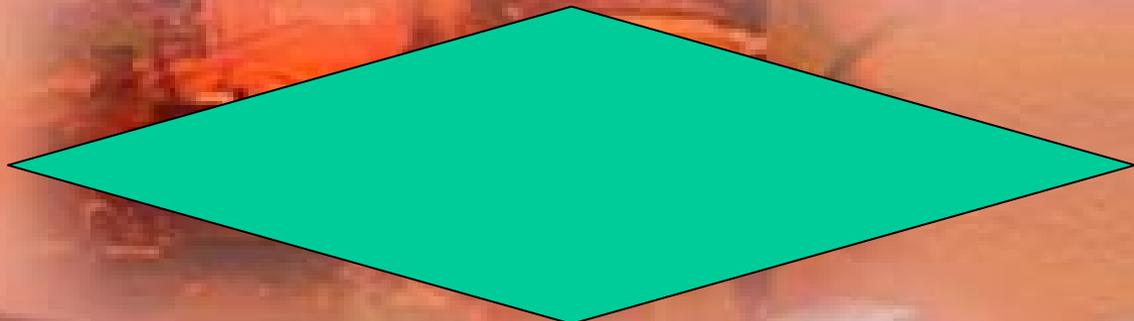
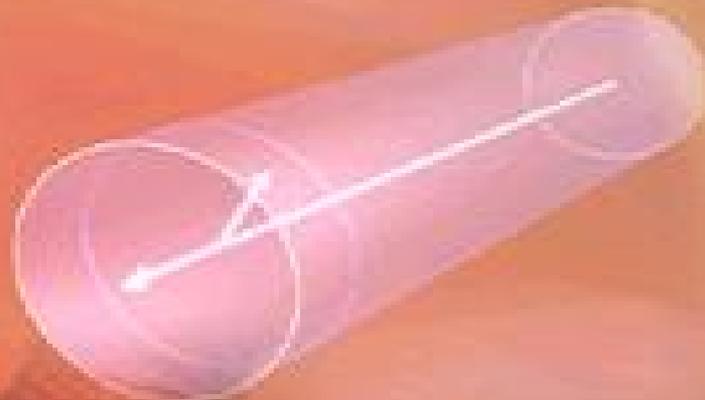
Storage Ring

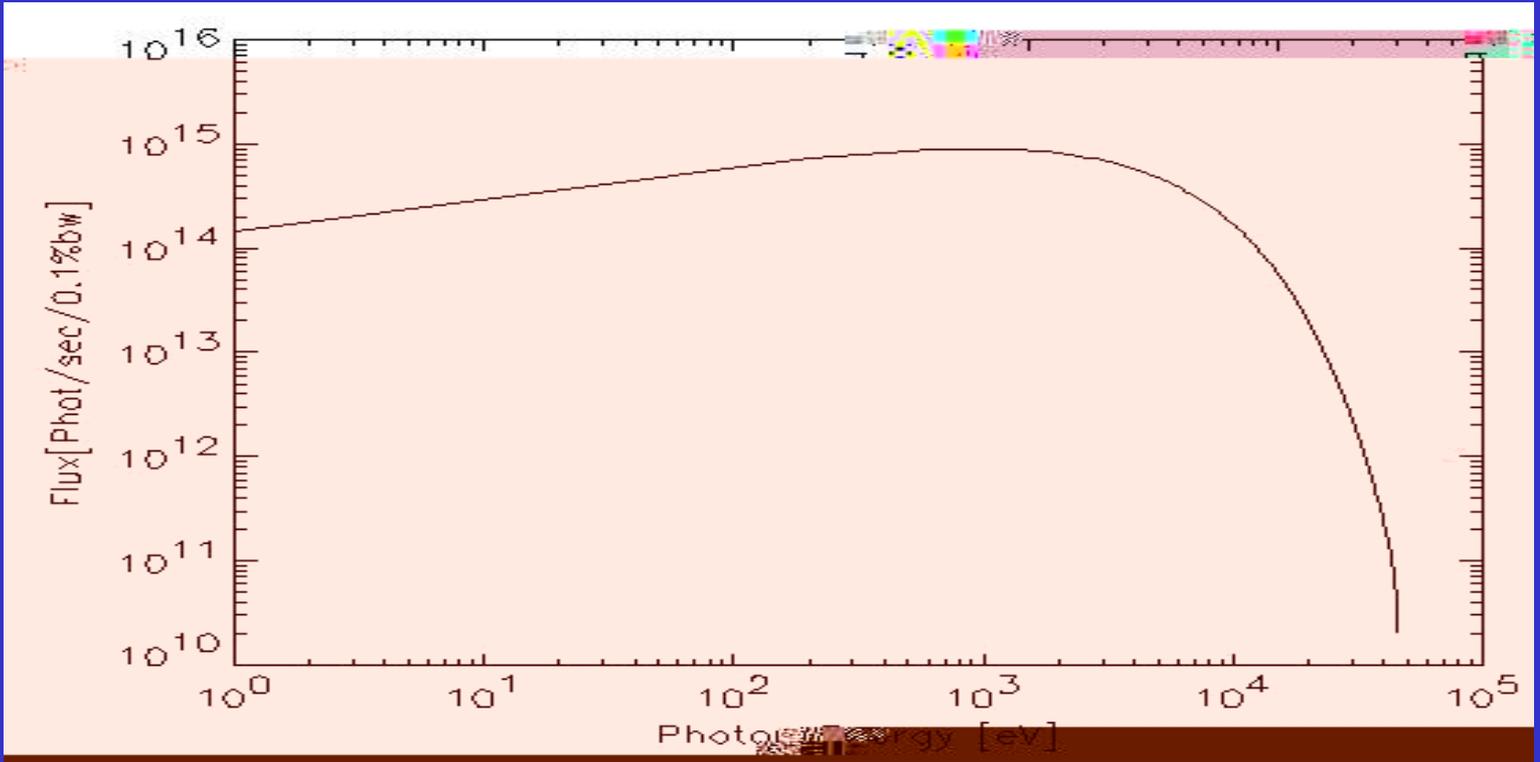


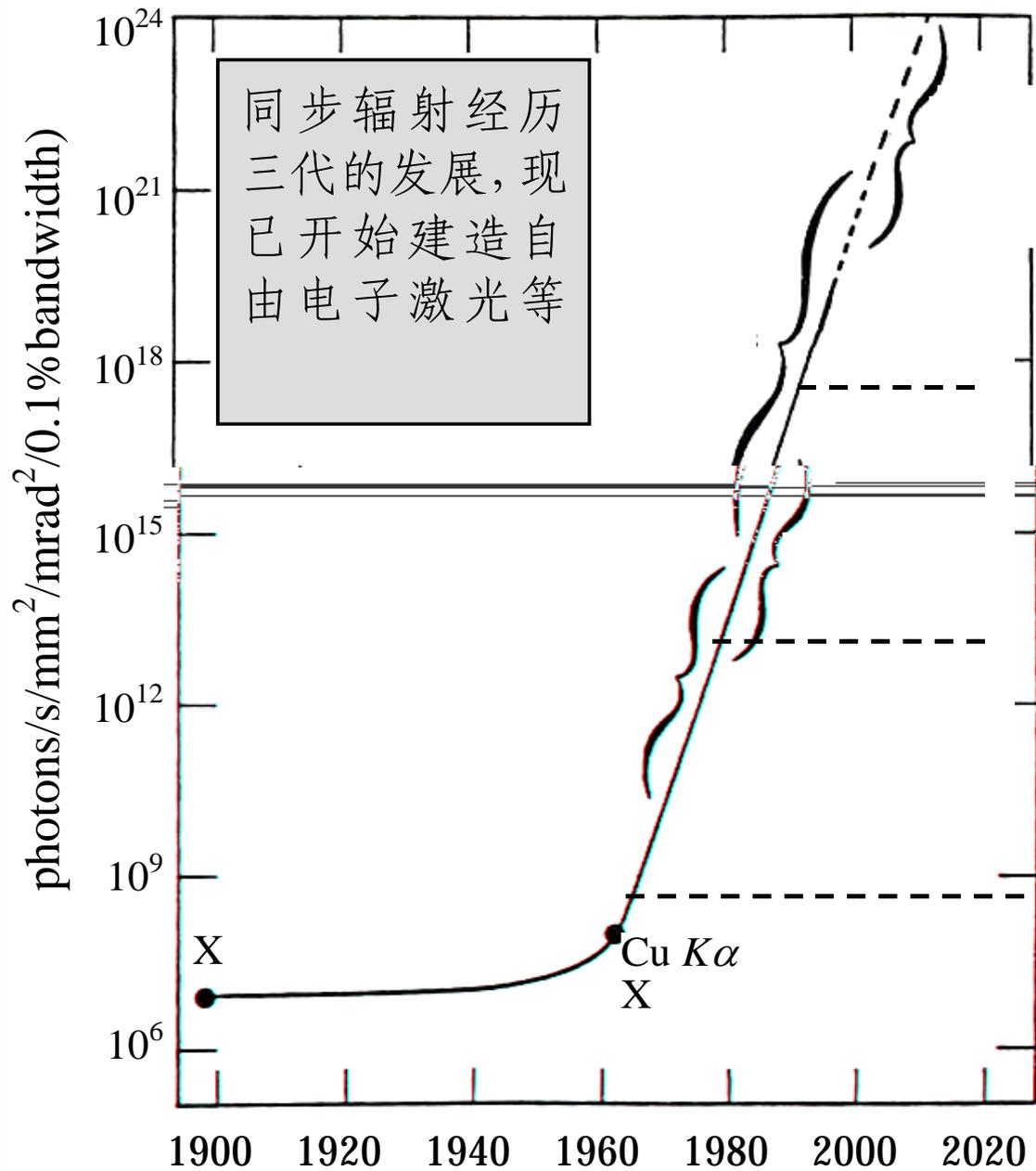


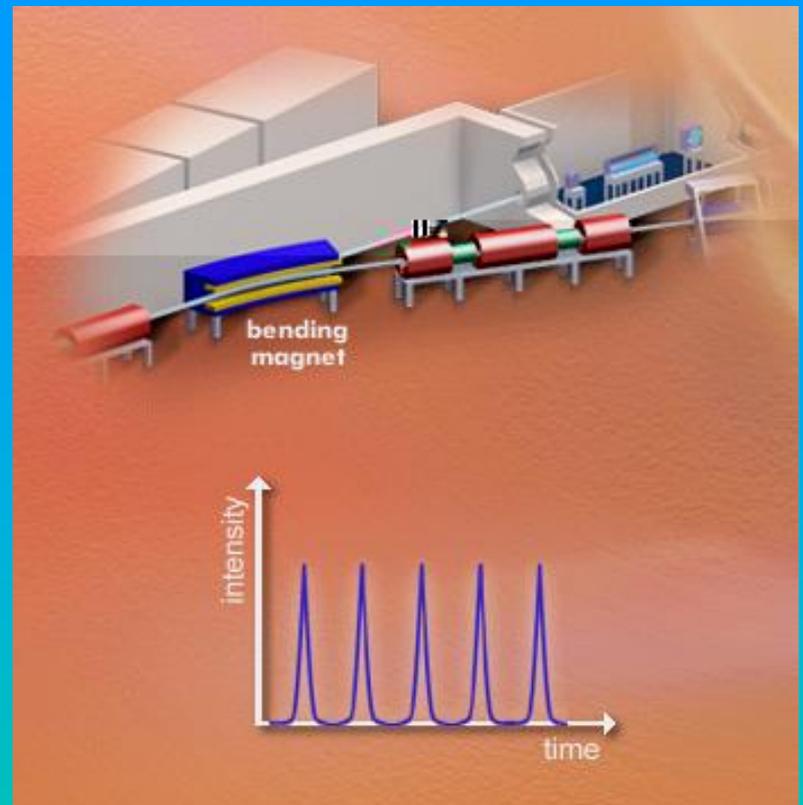
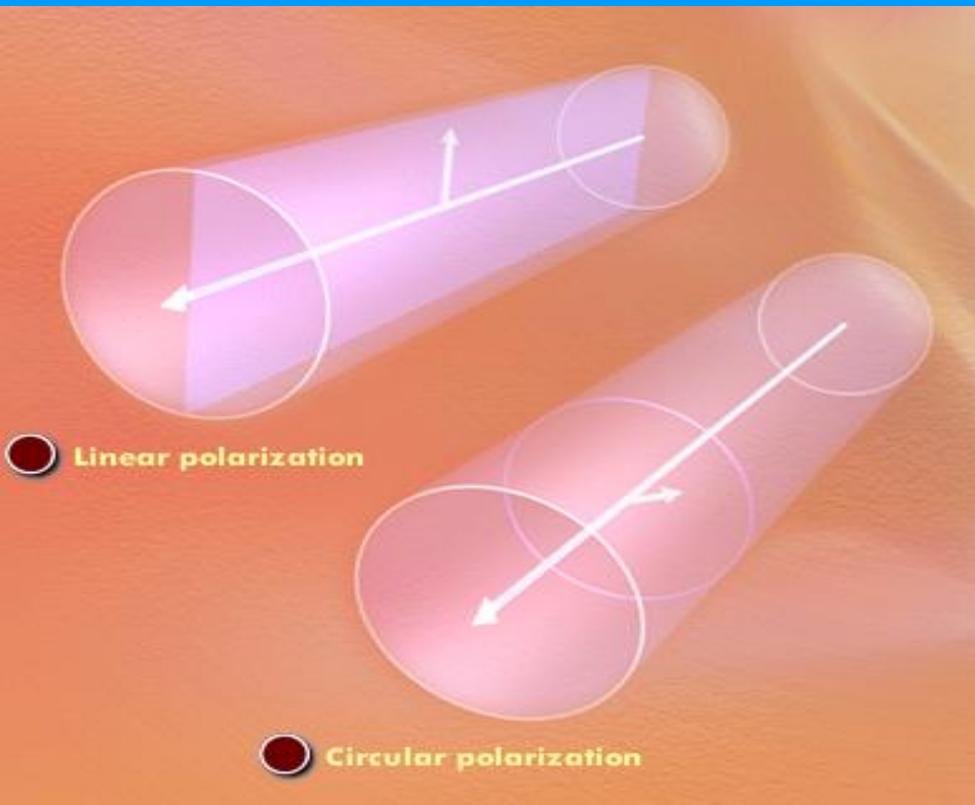
**ESRF**











ps



# X



**Röntgen, Wilhelm  
Conrad (1845-1923)**

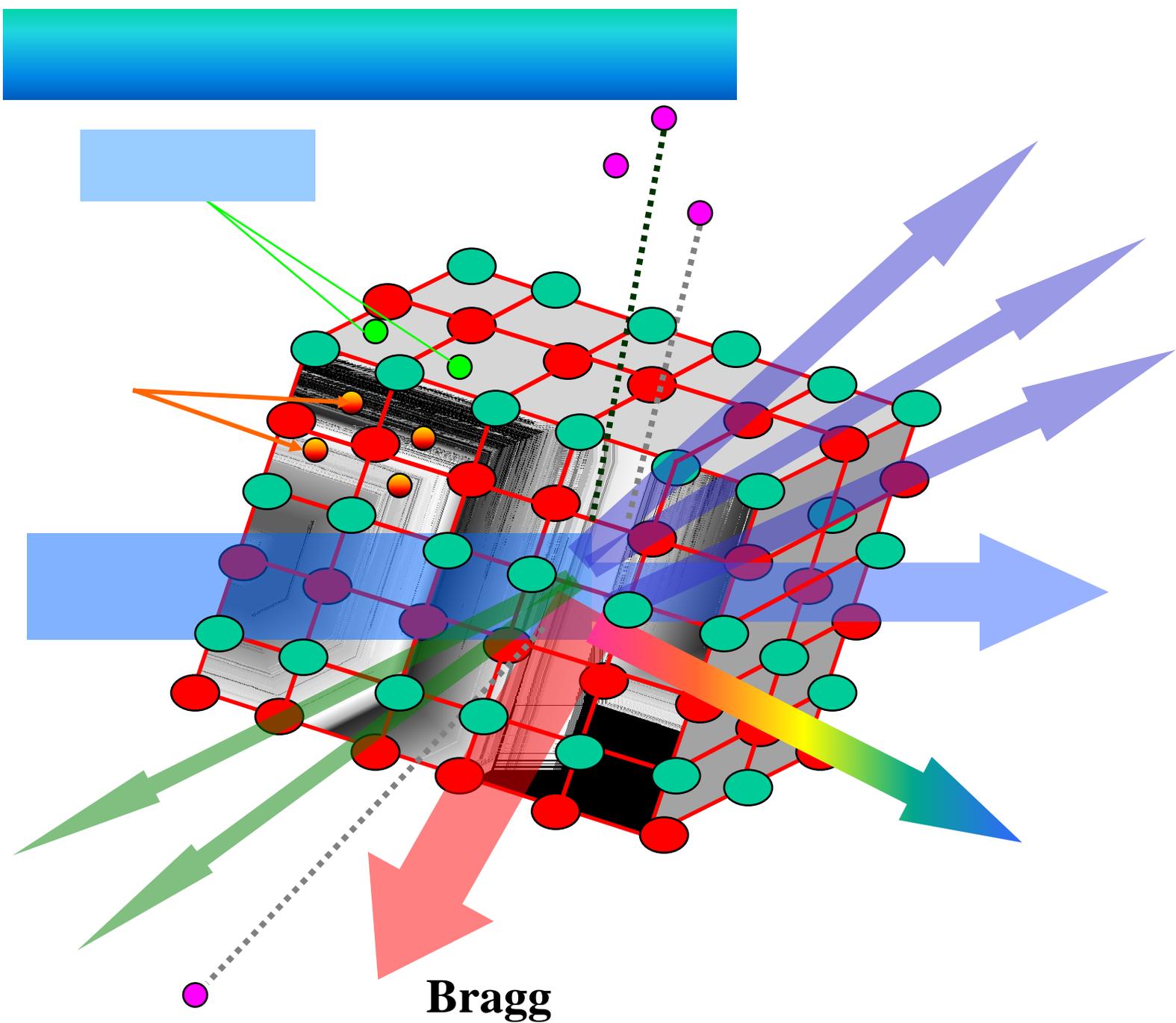
German physicist.  
He discovered x-rays in  
1895, opening the way  
for the field of radiology  
and the discovery of  
radioactivity. Nobel prize  
winner for physics in  
1901.

A composite image on an orange background illustrating X-ray applications. It includes a blue square with a white diffraction pattern of dots, a white box containing a red spectroscopy curve, and a black and white radiograph of a human chest. Labels are placed near each image.

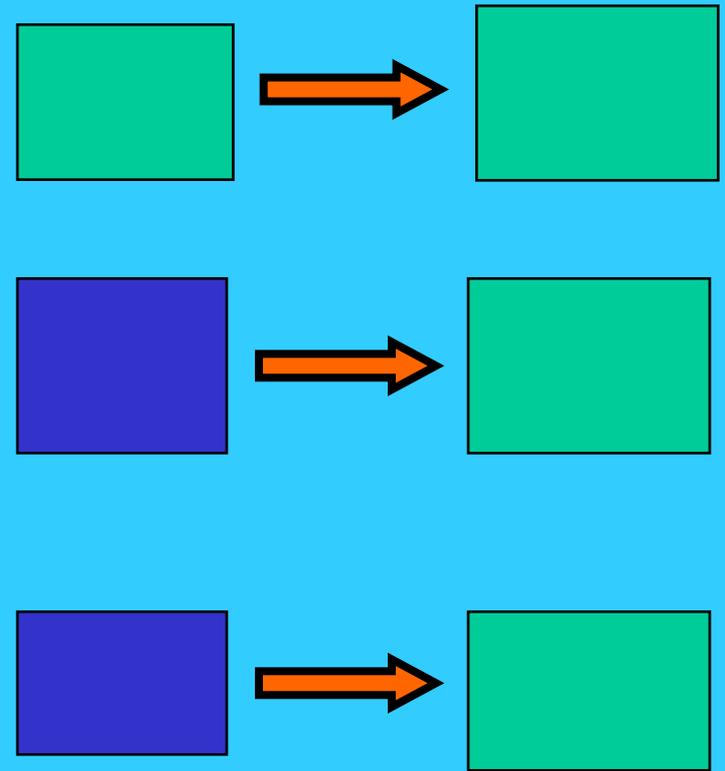
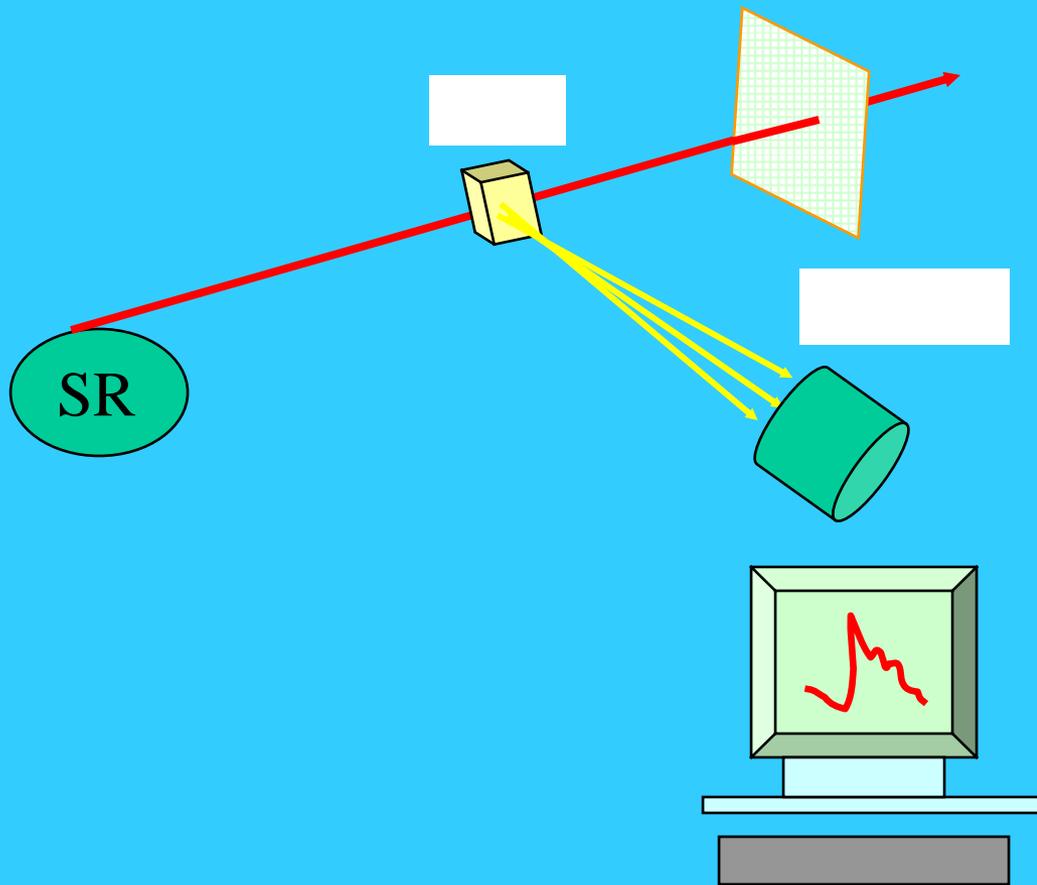
**Spectroscopy  
curve**

**Diffraction  
pattern**

**Radiography**



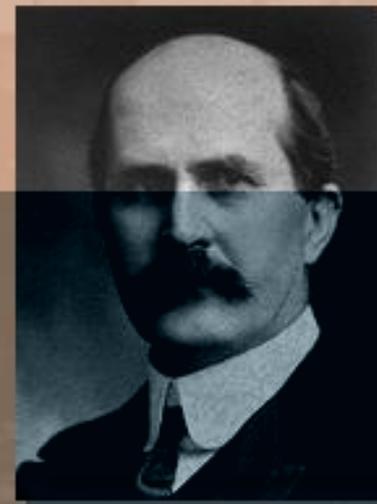
**Bragg**







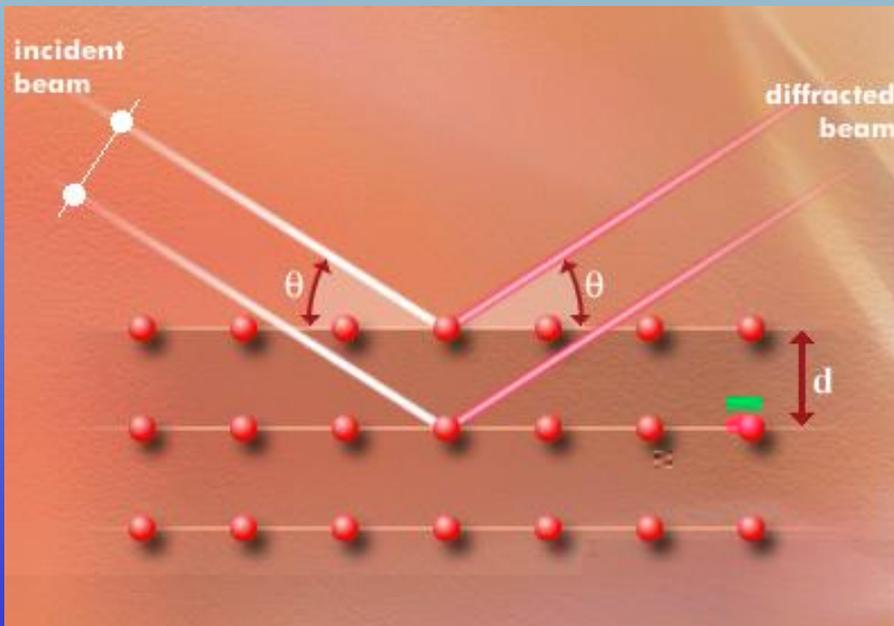
**Bragg, William Henry (1862-1942) and his son Bragg, William Lawrence (1890-1971)**



The Nobel Foundation

**British physicists. They established the basis of both crystallography and spectroscopy of x-rays (1914).**

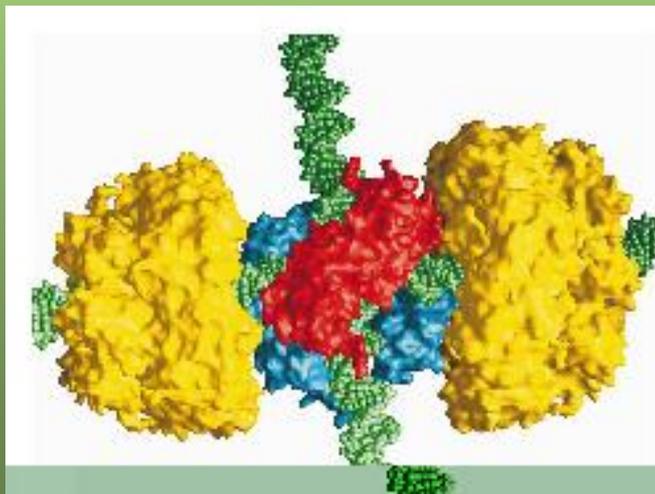
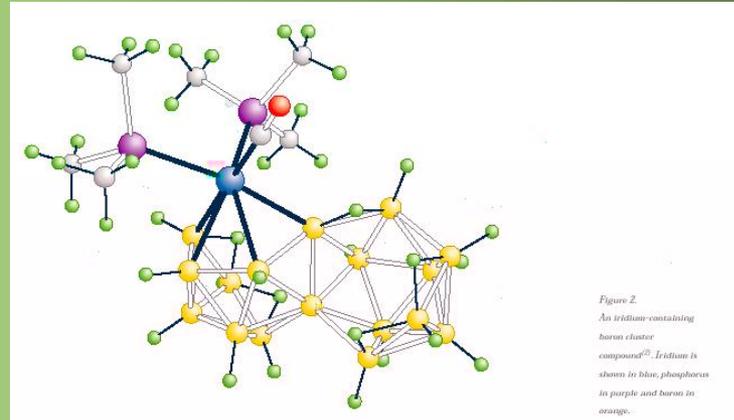
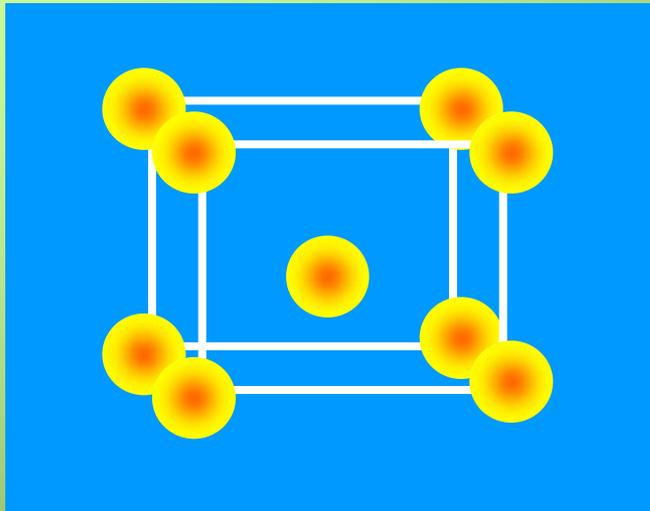
**Nobel Prize**



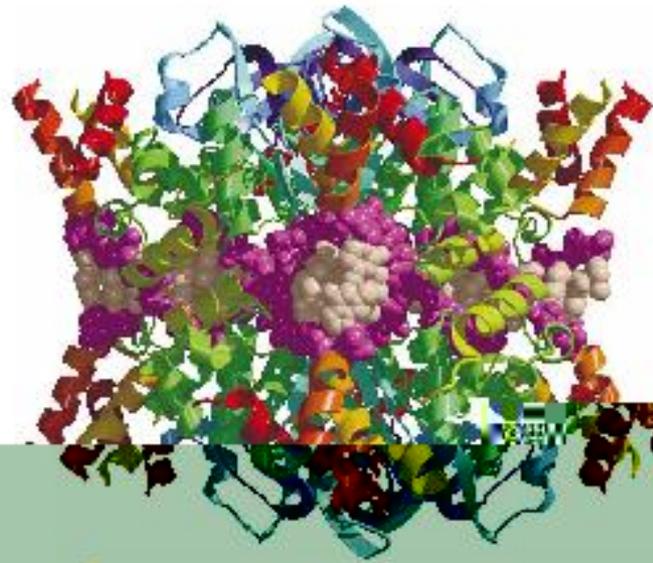
**Bragg**

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

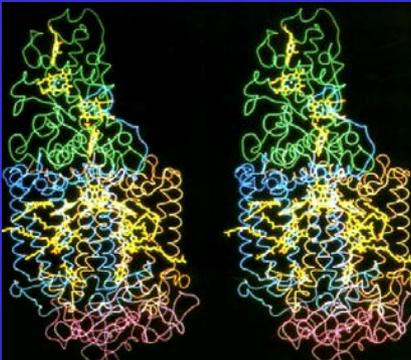
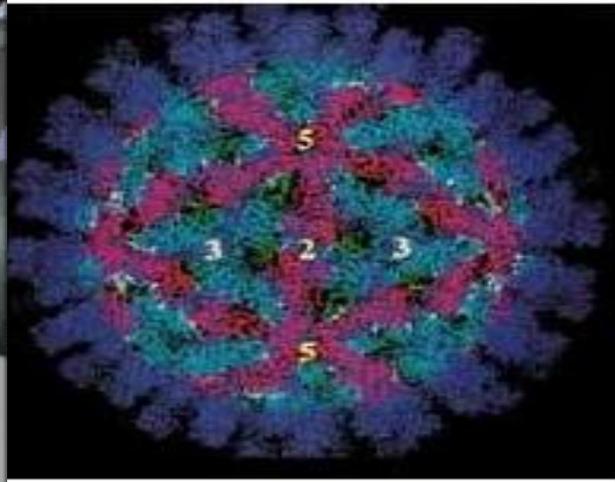




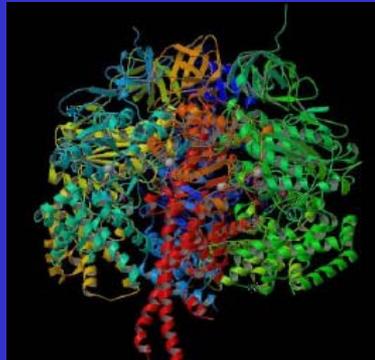
(c) RuvB (yellow) can be modelled onto the arms of the junction to form a RuvAB complex which causes the junction branchpoint to migrate from its original starting point by exchanging strands of DNA.



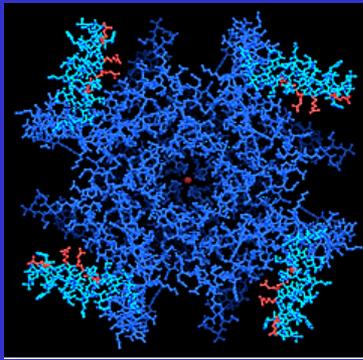
10 M. leprae RuvA octamer with sandwiched Holliday junction.



1988



1997



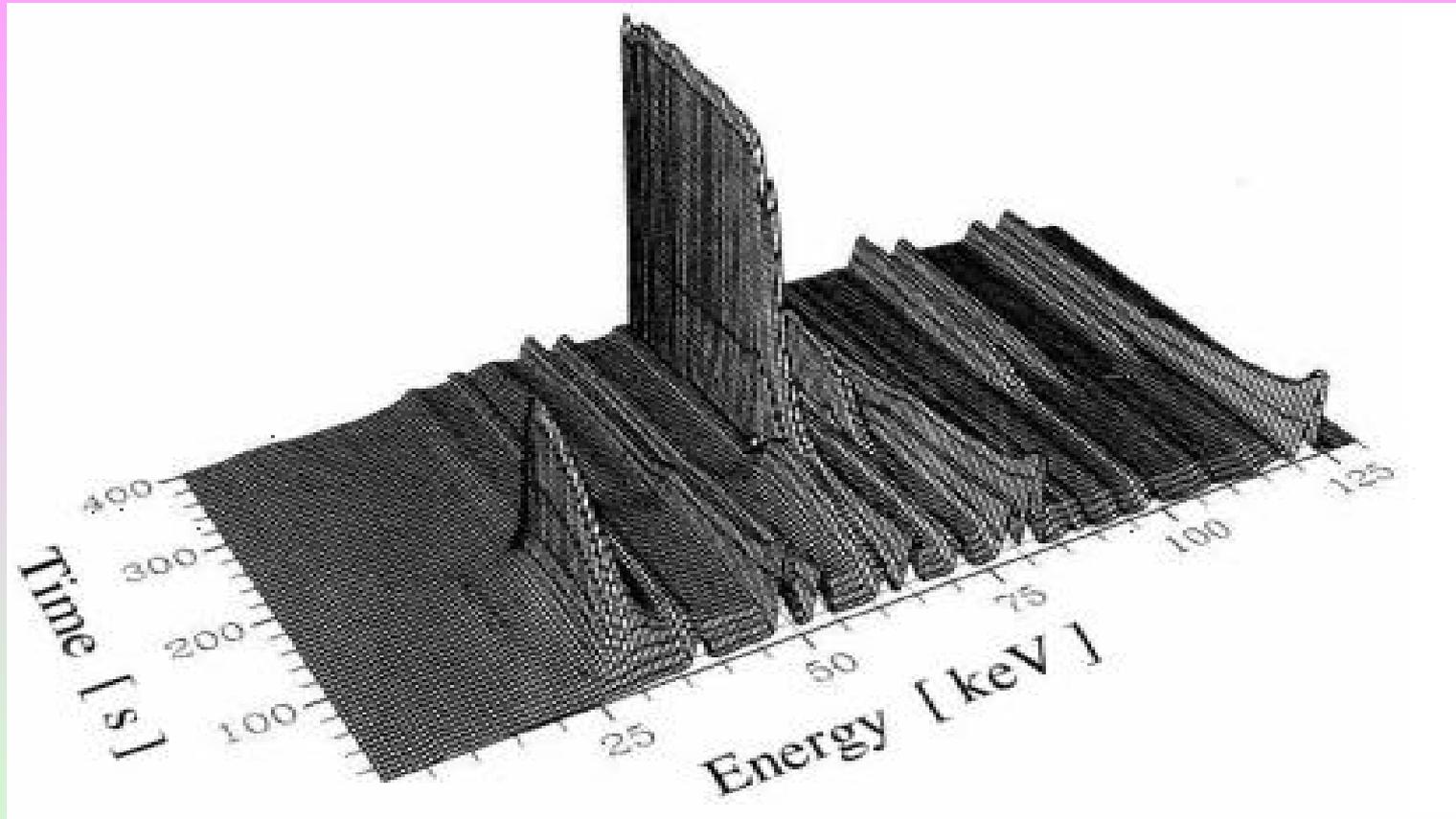
2003



2006

RNA

-



150

31KeV

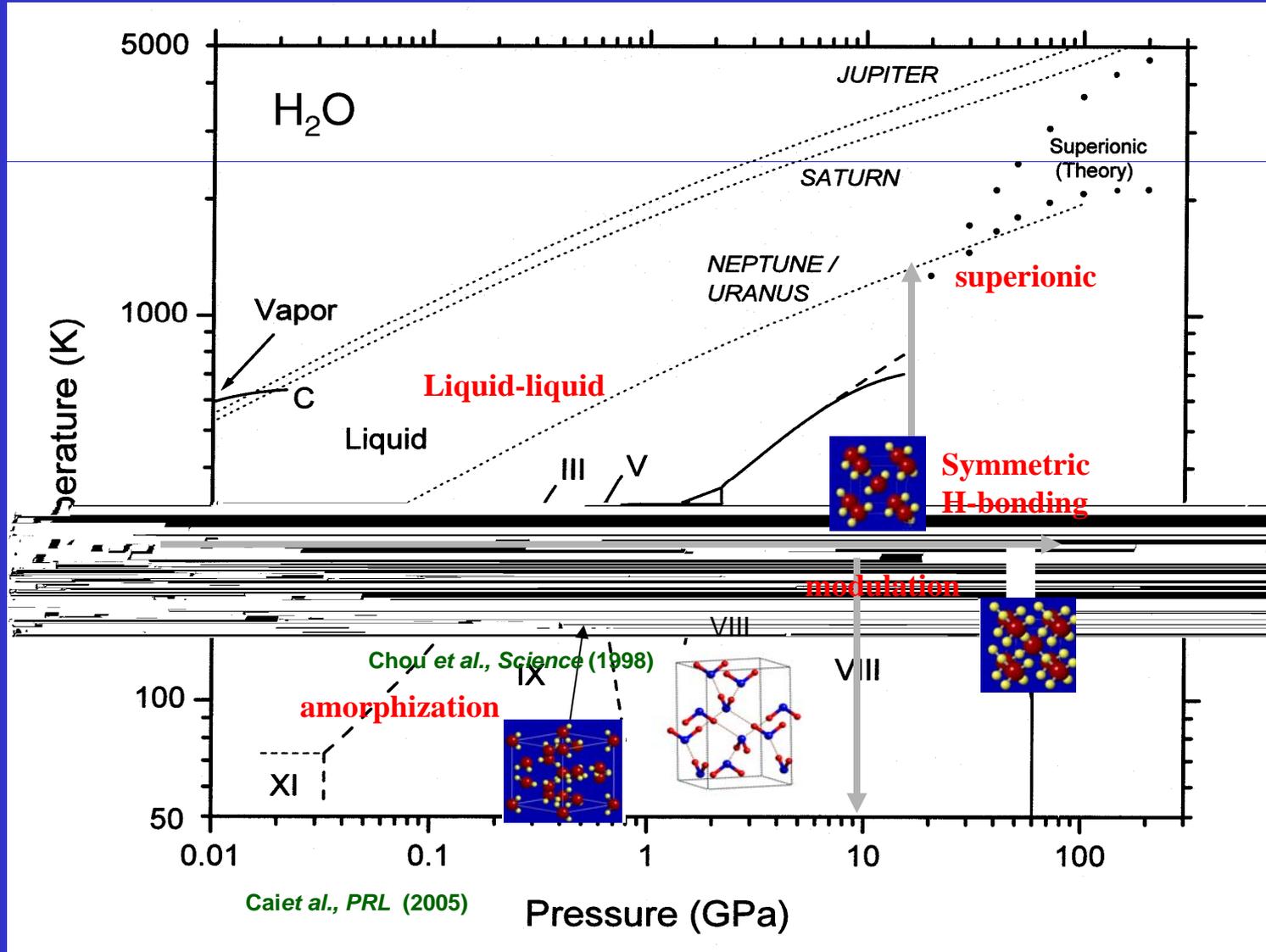


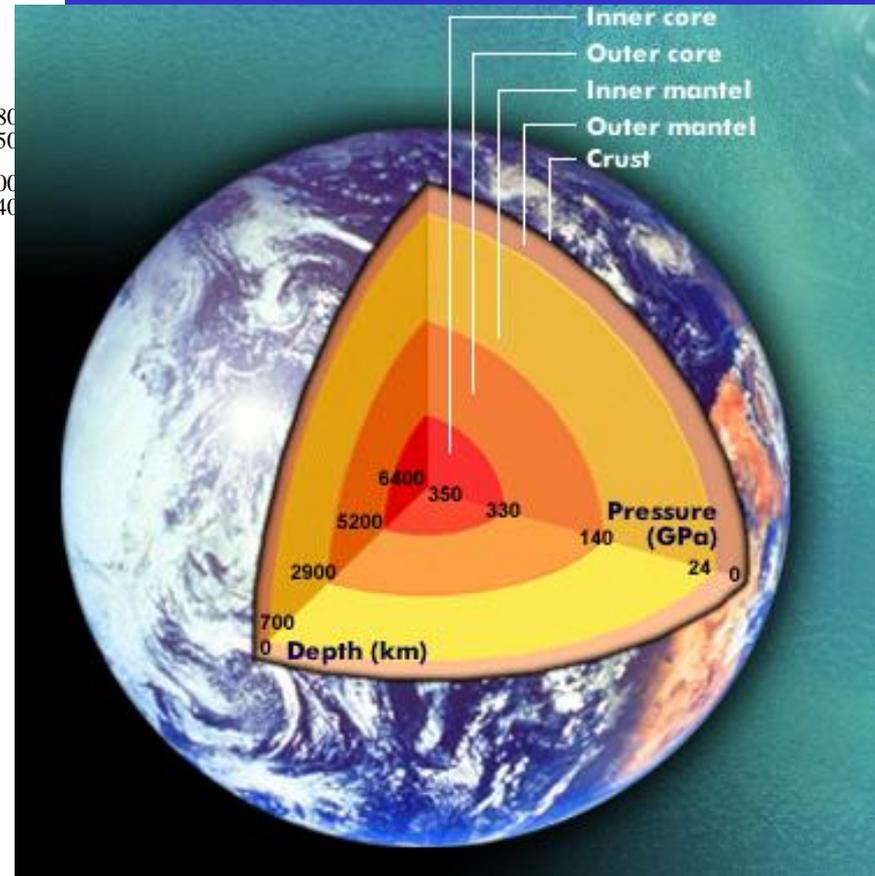
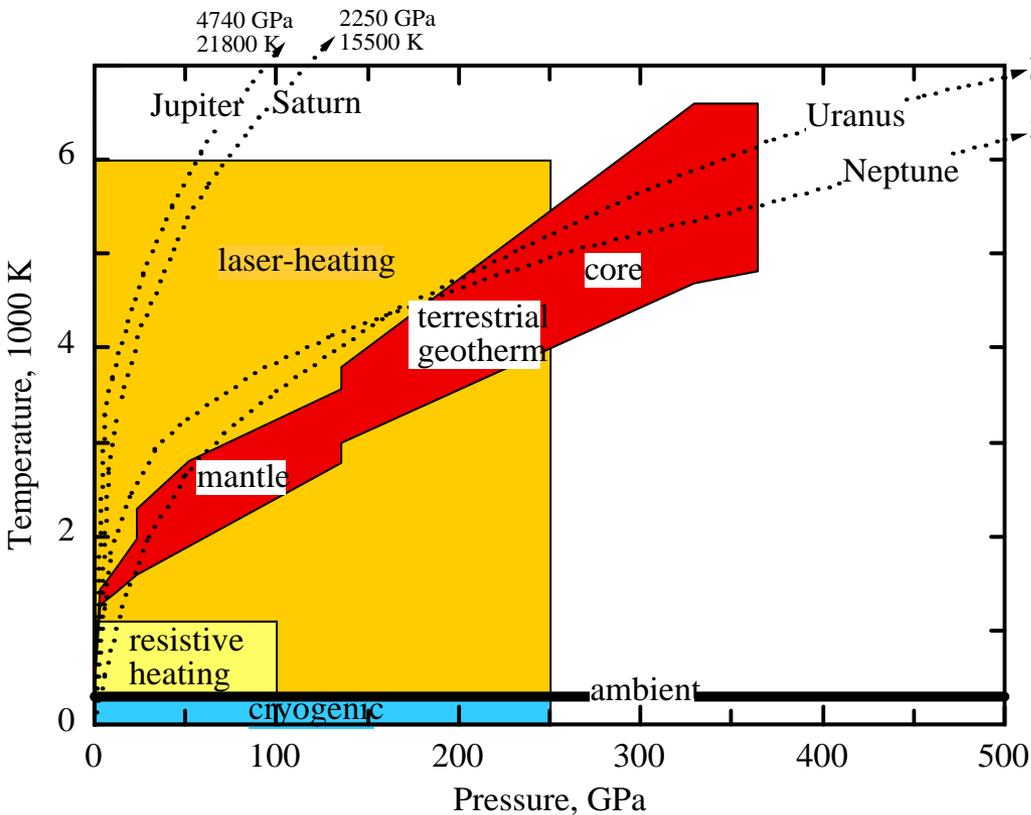
**P-T-X**



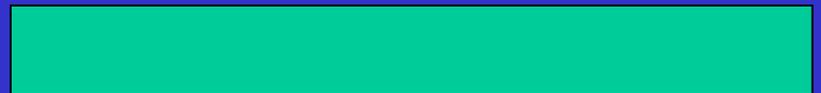
# The high-pressure behavior of water

continues to present new questions and surprises

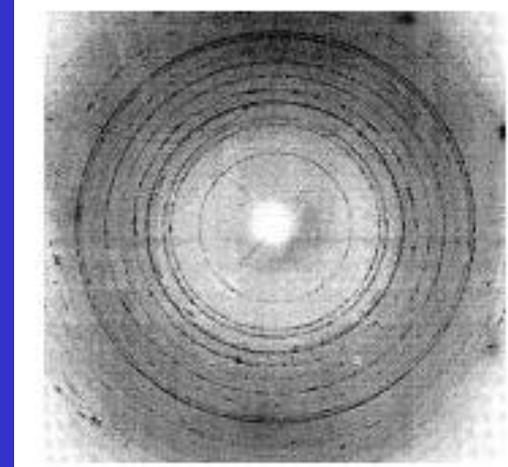
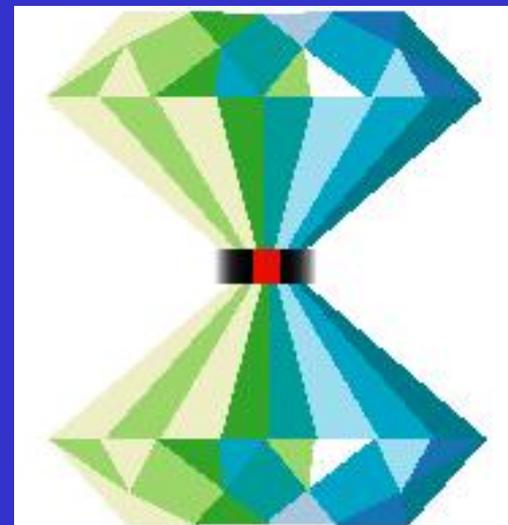
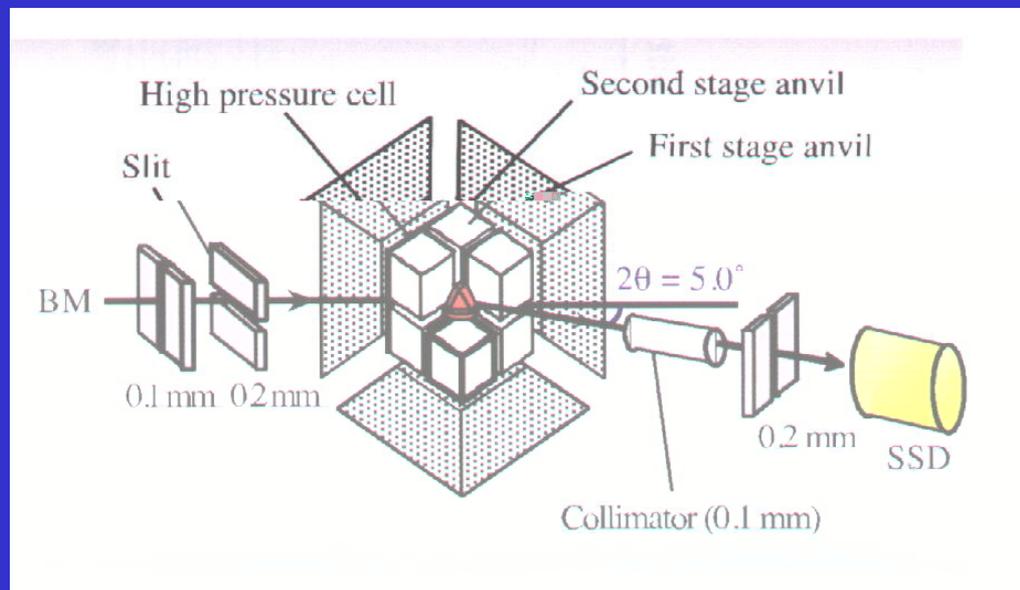




*In-Situ X-ray Probes*



# X



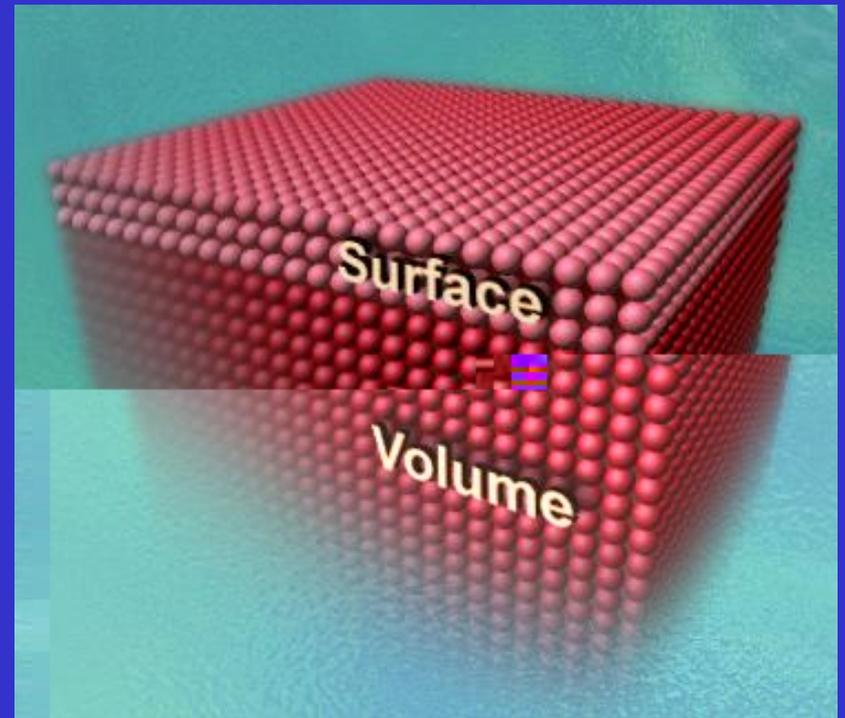
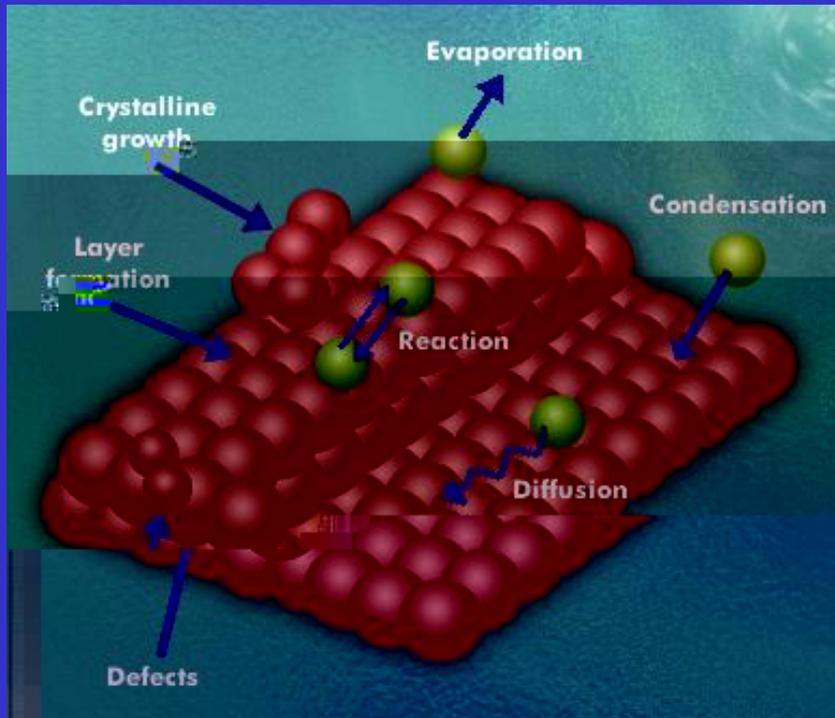
# X

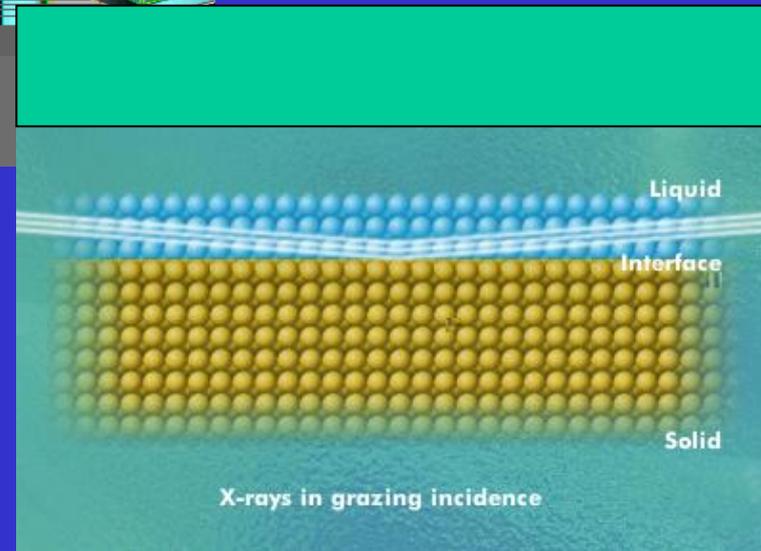
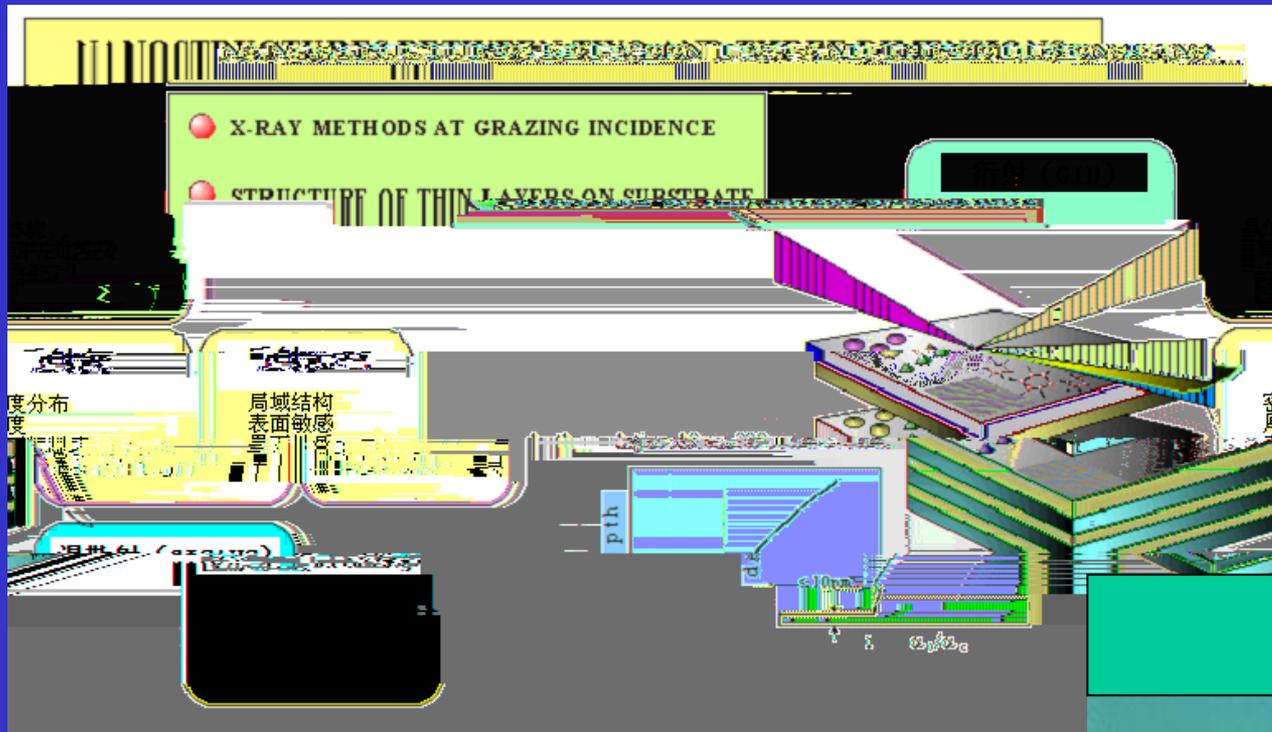
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# BSRF

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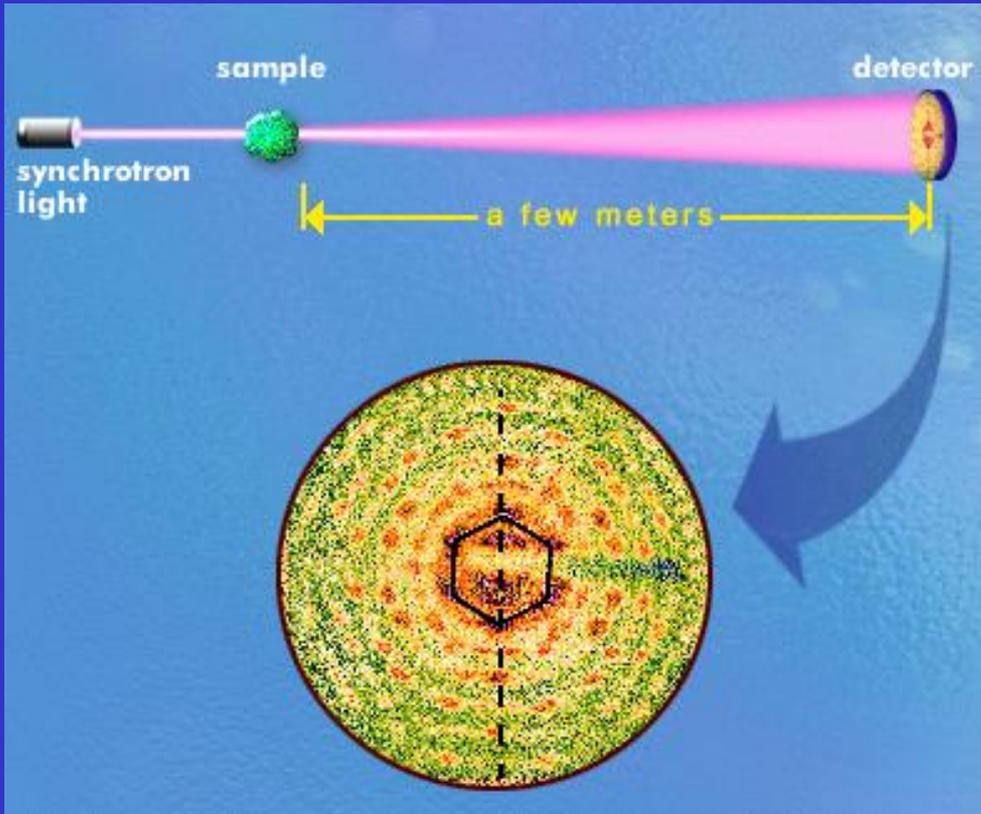
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$$0^\circ \leq \theta \leq \sim 90^\circ$$

1~100nm

# SAXS

The diagram features the SAXS equation  $I(q) = 4\pi(\Delta\rho)^2V \int_0^\infty r^2 \gamma(r) \frac{\sin qr}{qr} dr$  centered on a yellow background. Six cyan callout boxes are arranged around the equation, with lines pointing to specific terms: one at the top left points to  $I(q)$ , one at the top center points to  $\Delta\rho$ , one at the top right points to  $V$ , one at the bottom left points to  $\gamma(r)$ , one at the bottom center points to  $r^2$ , and one at the bottom right points to  $\frac{\sin qr}{qr}$ .

$$I(q) = 4\pi(\Delta\rho)^2V \int_0^\infty r^2 \gamma(r) \frac{\sin qr}{qr} dr$$

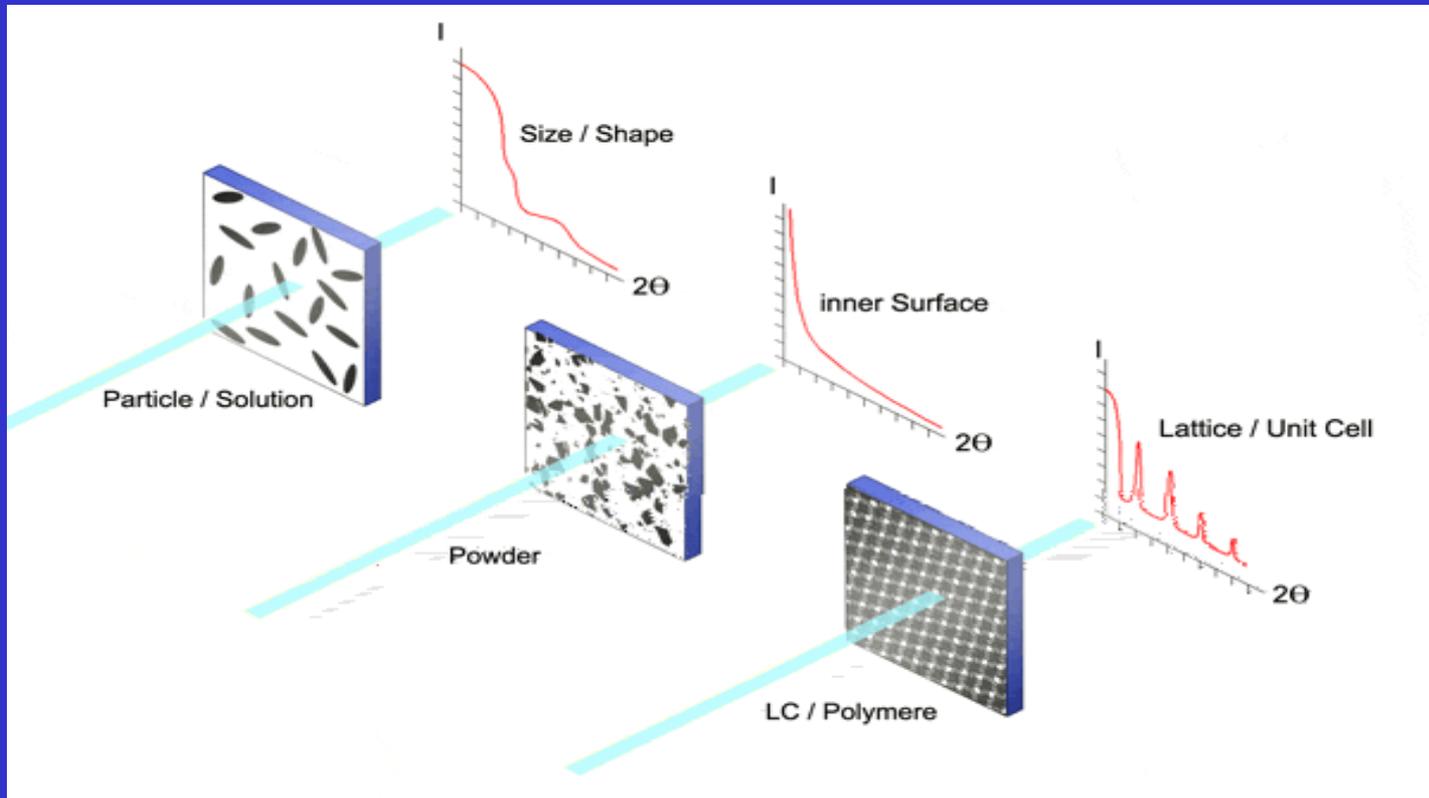
- 

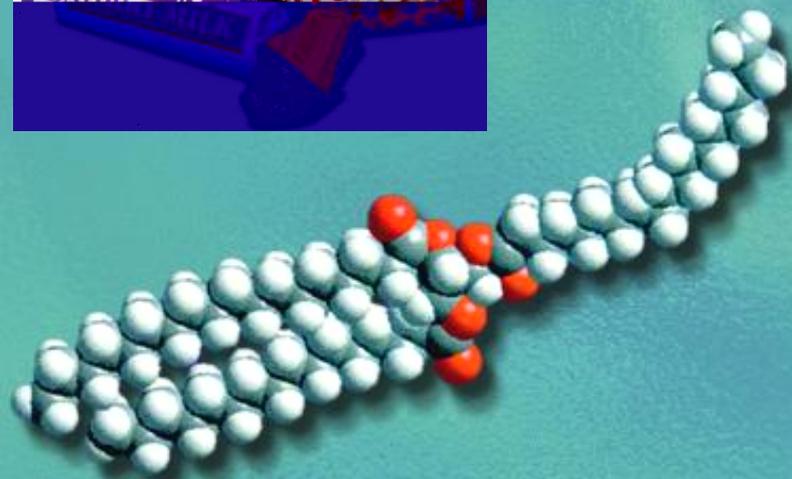
$\rho$

- 

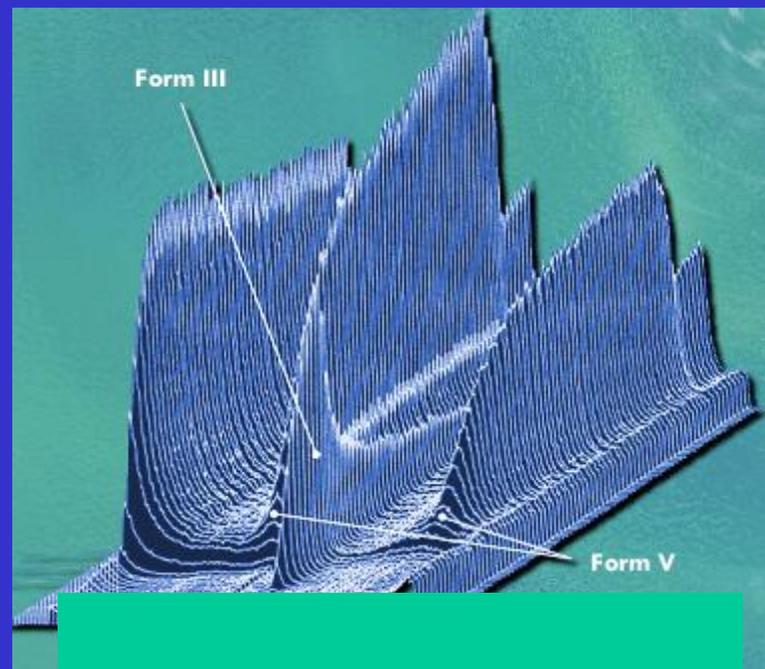
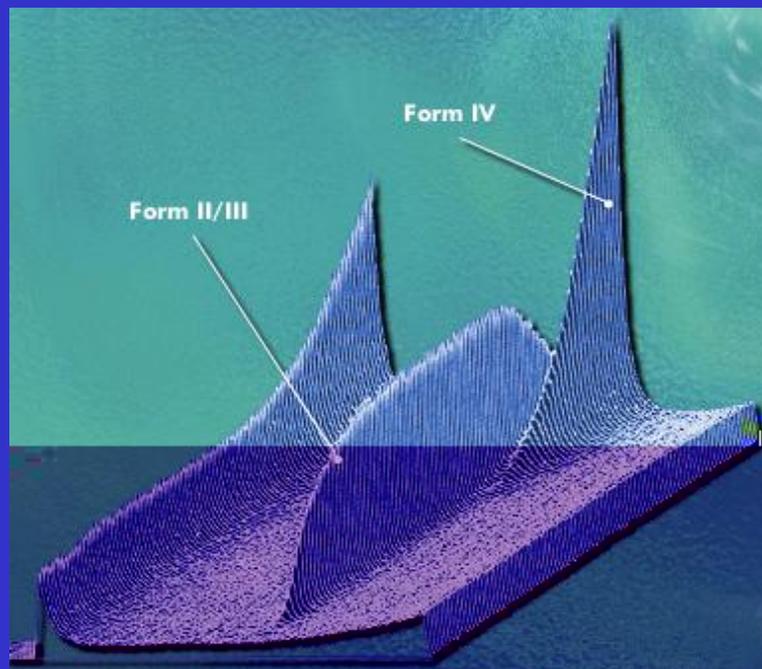
$\gamma$

-





One of the basic fat molecules of chocolate





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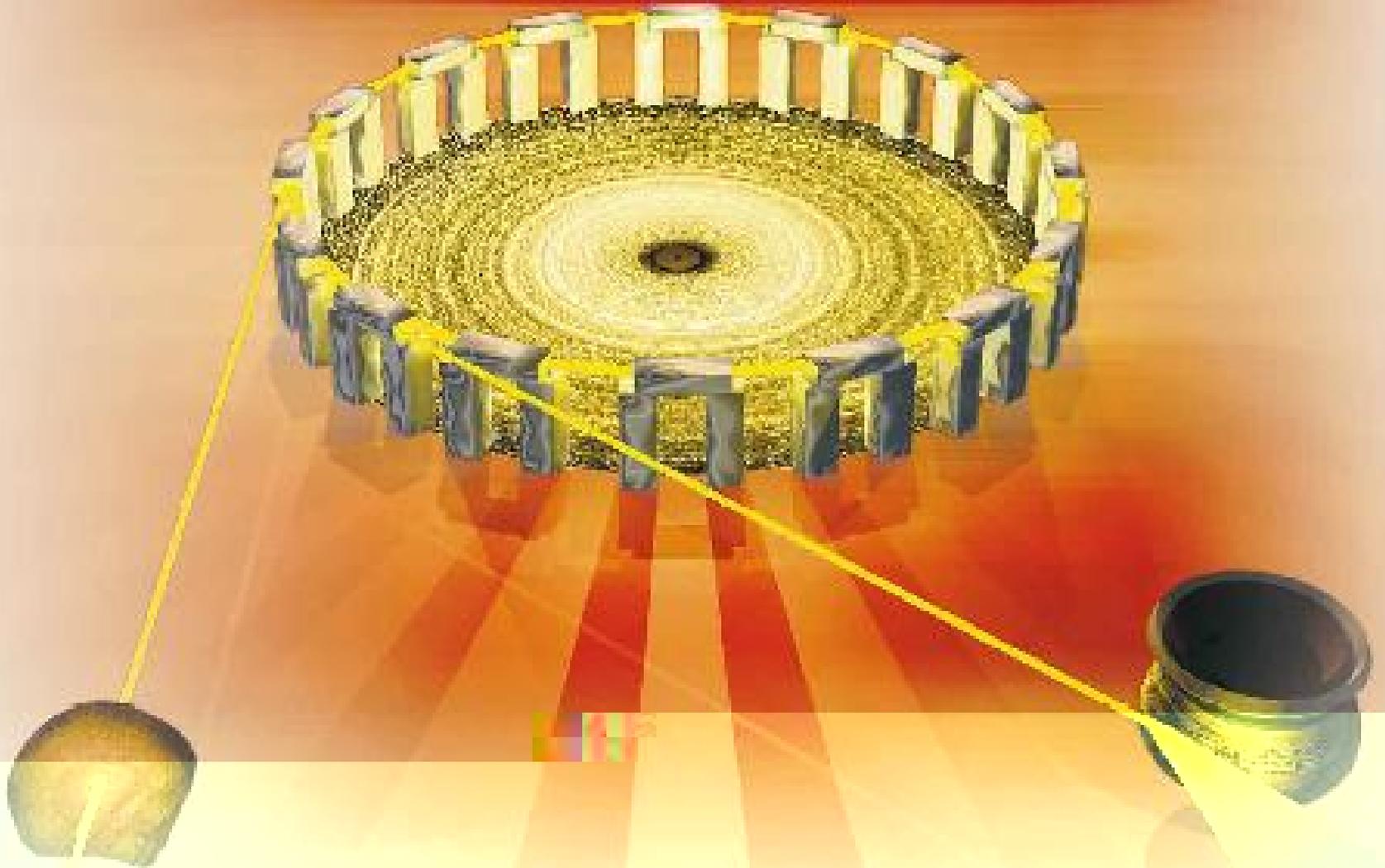
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X



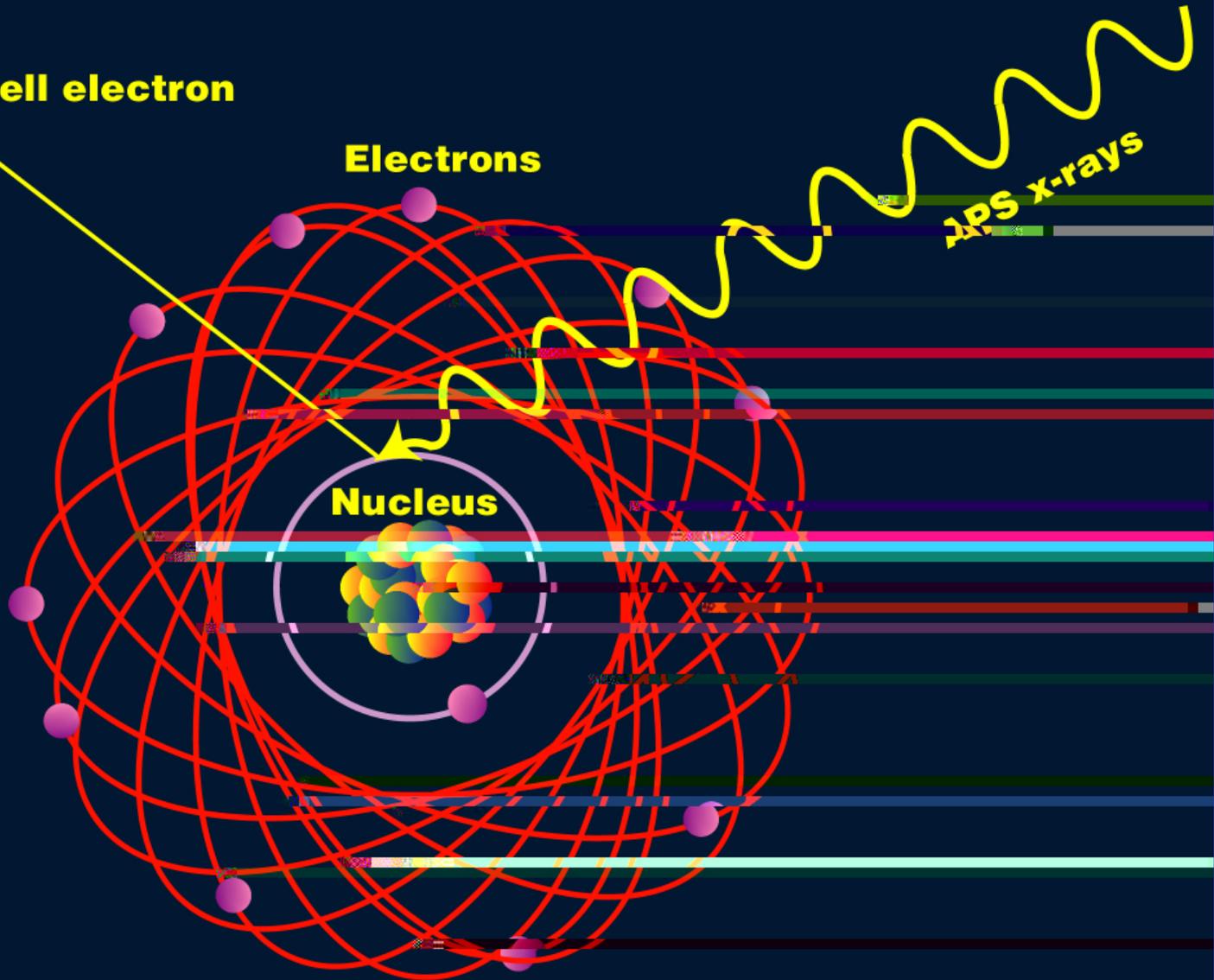


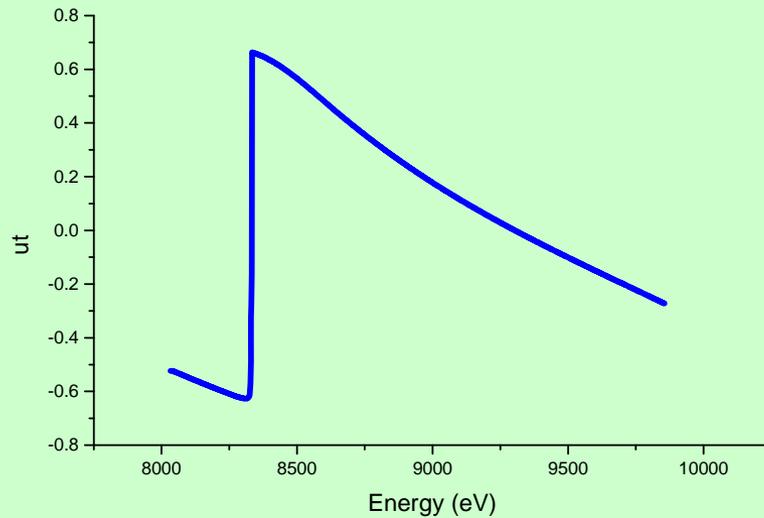
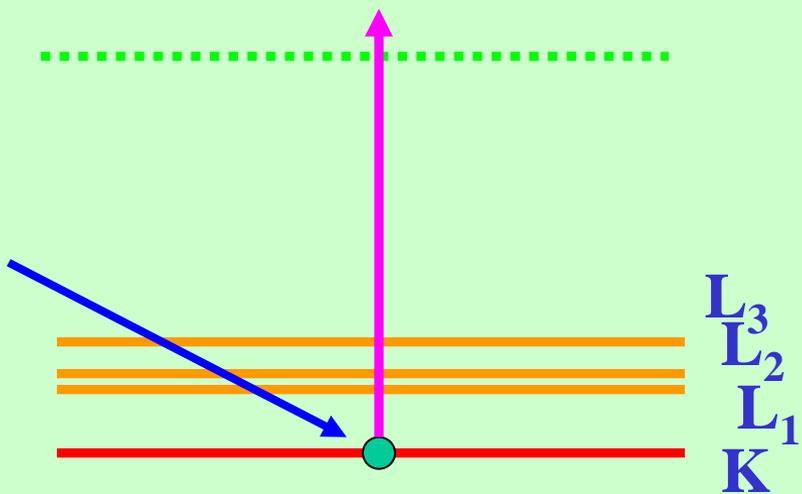
**Liberated K-shell electron**

**Electrons**

**Nucleus**

**APS X-rays**





X-

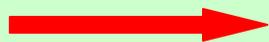
(

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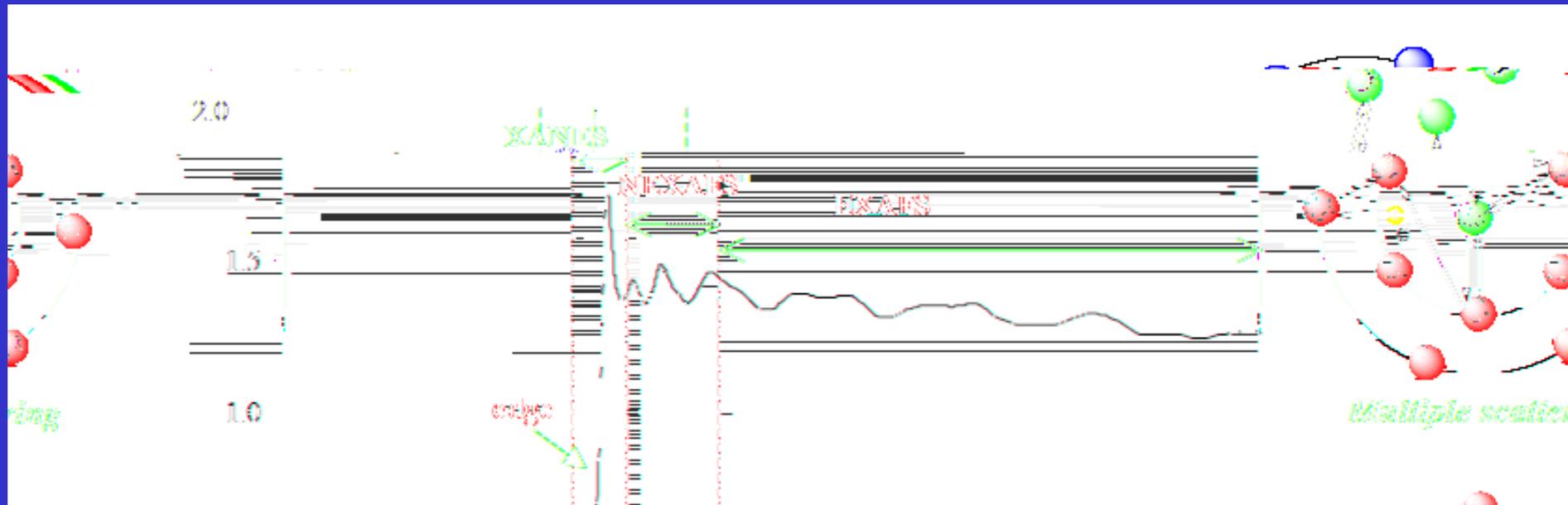




-0.15

8200 8400 8600 8800 9000 9200 9400 9600 9800 10000

# ( X-ray Absorption Fine Structure )



# EXAFS :

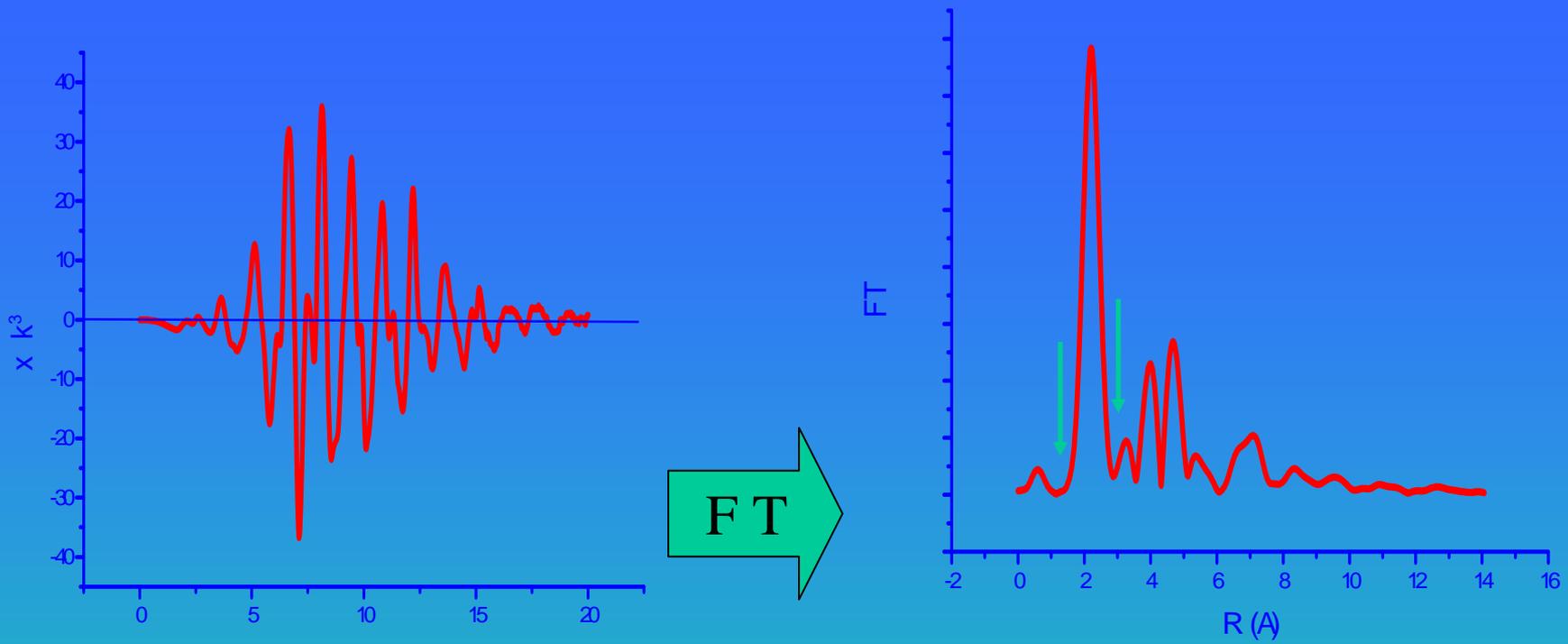
$$\chi(k) = \sum_j \frac{S_0^2 N_j F_j(k)}{k R_j^2} \underbrace{e^{-2k^2 \sigma_j^2} e^{-2R_j / \lambda(k)}}_{\text{Debye-Waller factor}} \underbrace{\sin[2kR_j + \delta(k)]}_{\text{phase shift}}$$

The equation is annotated with several red speech bubbles pointing to different parts of the formula:

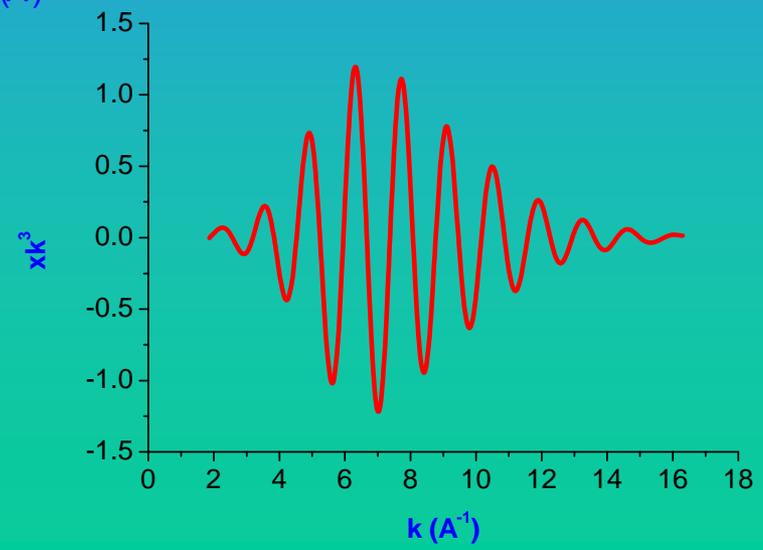
- A speech bubble points to the  $S_0^2 N_j F_j(k)$  term in the numerator.
- A speech bubble points to the  $k R_j^2$  term in the denominator.
- A speech bubble points to the  $e^{-2k^2 \sigma_j^2} e^{-2R_j / \lambda(k)}$  term, which is underlined and labeled "Debye-Waller factor".
- A speech bubble points to the  $\sin[2kR_j + \delta(k)]$  term, which is underlined and labeled "phase shift".

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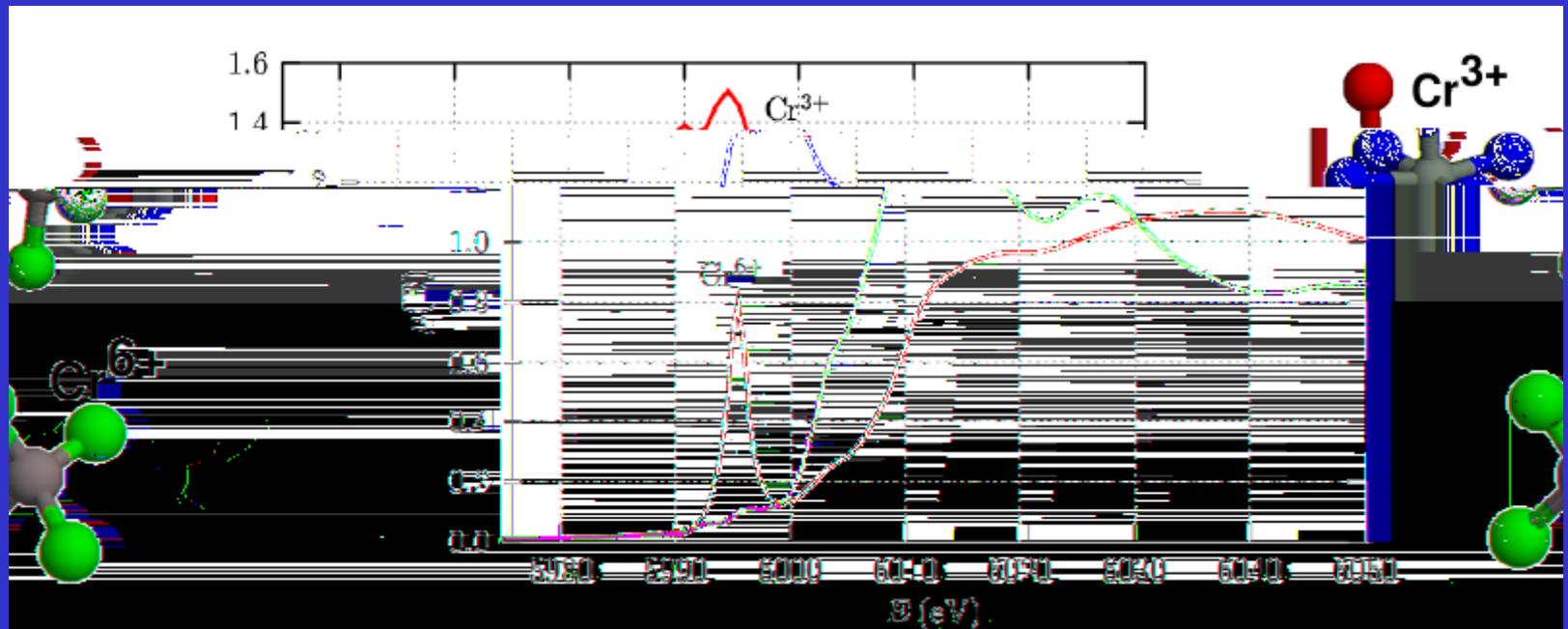
Wavevector  $k$  ( $\text{\AA}^{-1}$ )



$k$  ( $\text{\AA}^{-1}$ )

# XANES

:



ion state ..... The XANES of Cr<sup>3+</sup> and Cr<sup>6+</sup> shows a dramatic dependence on oxidation and coordination chemistry.

es dramatically ..... for ions with partially filled d shells, the  $p-d$  hybridization changes as **regular octahedra** distort, and is very large for **tetrahedral** coordi-

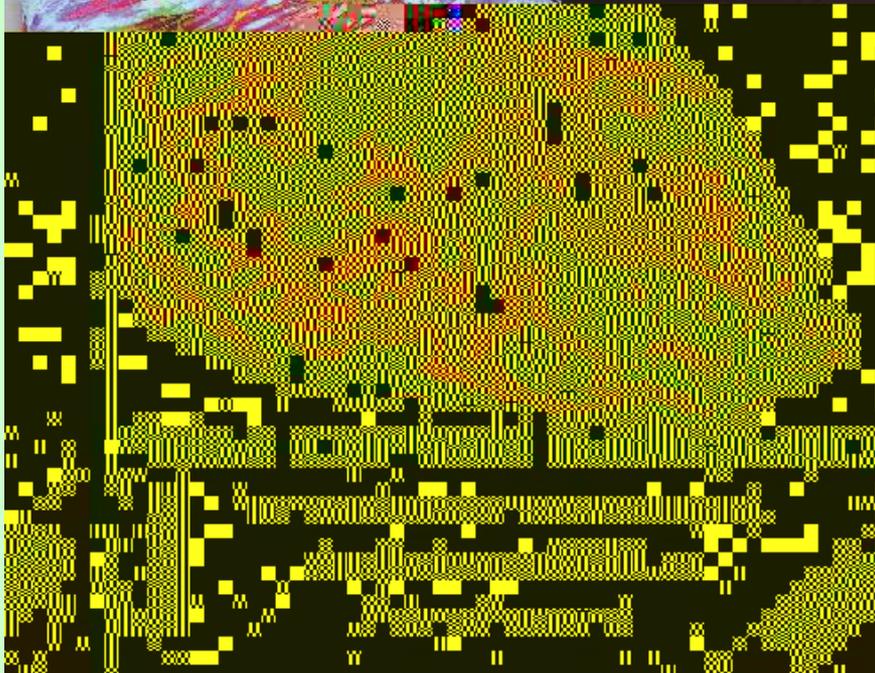
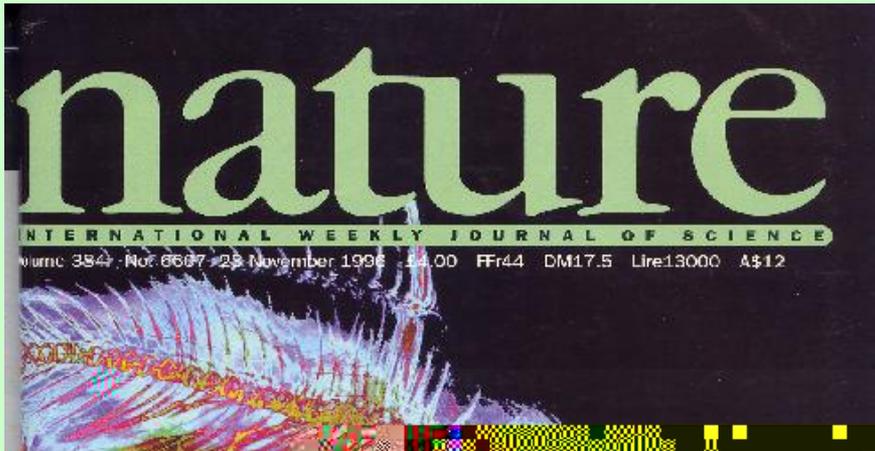
re, hence it is ..... ally, the  $p-d$  hybridization is very large for **tetrahedral** coordi-



.....)

.....





$$n = 1 - \delta + i\beta$$

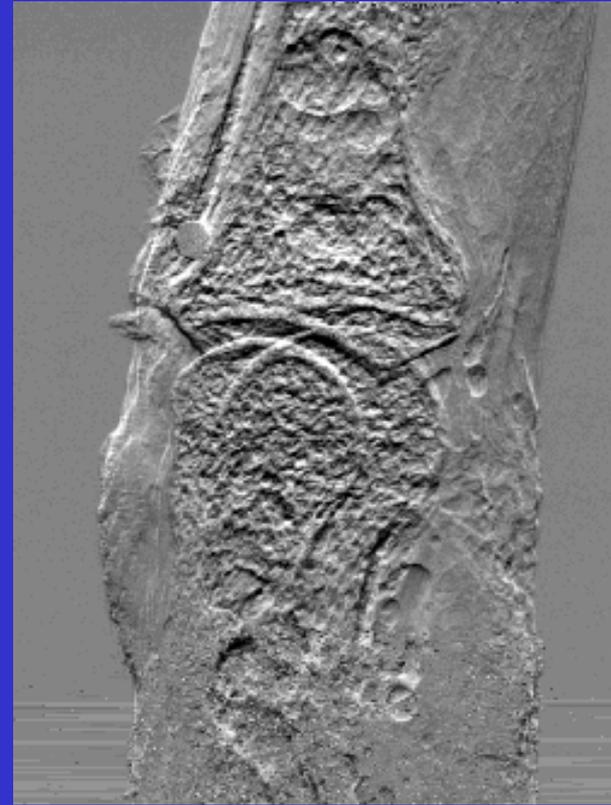
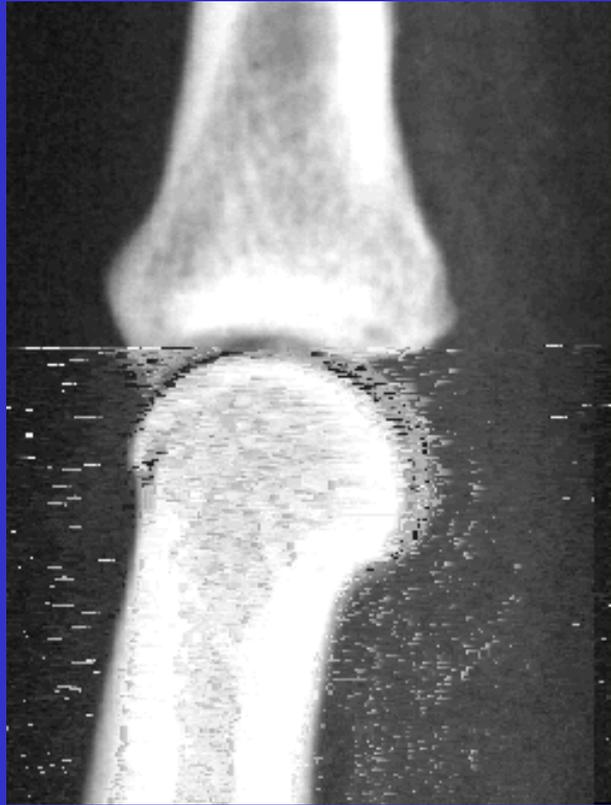
$$1 \gg \delta \gg \beta$$

$\delta\alpha$

$\beta\alpha$

$\delta$

$\beta$

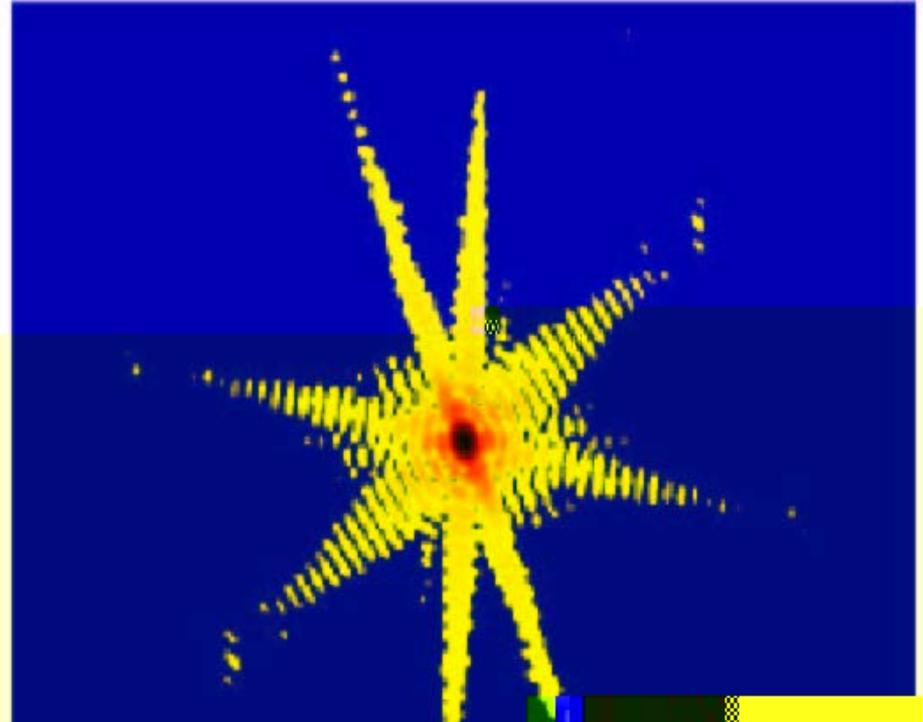
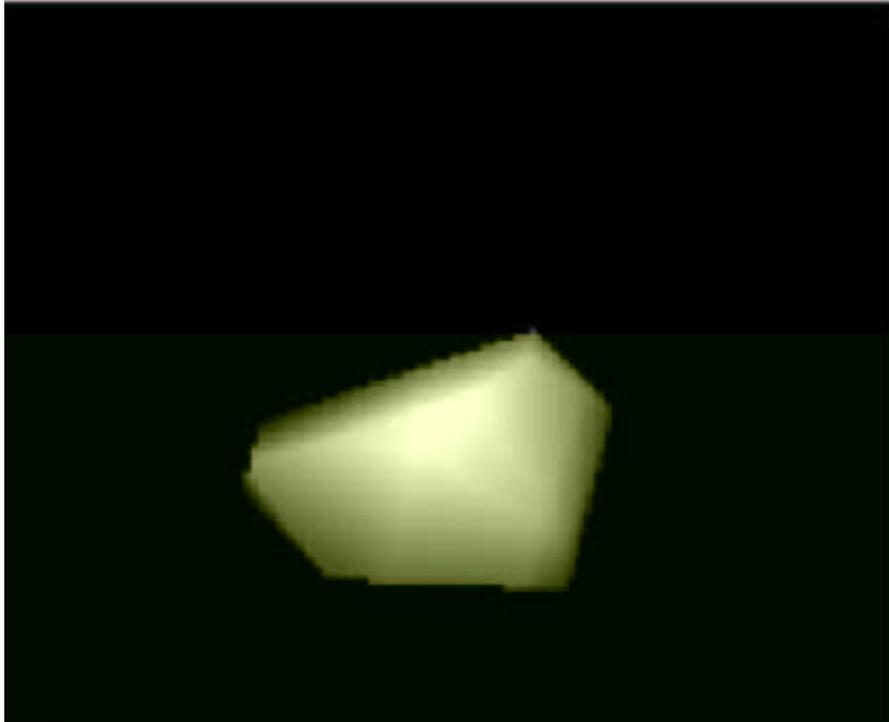
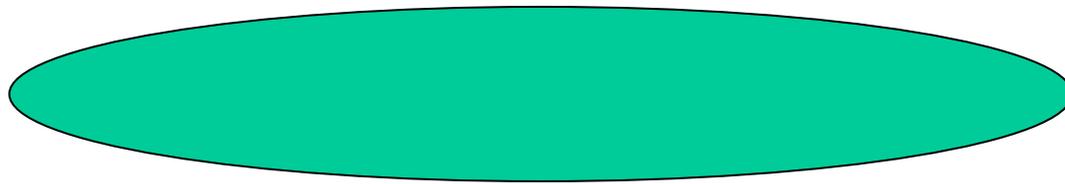


X

# 相干衍射成像 (CDI)

- 

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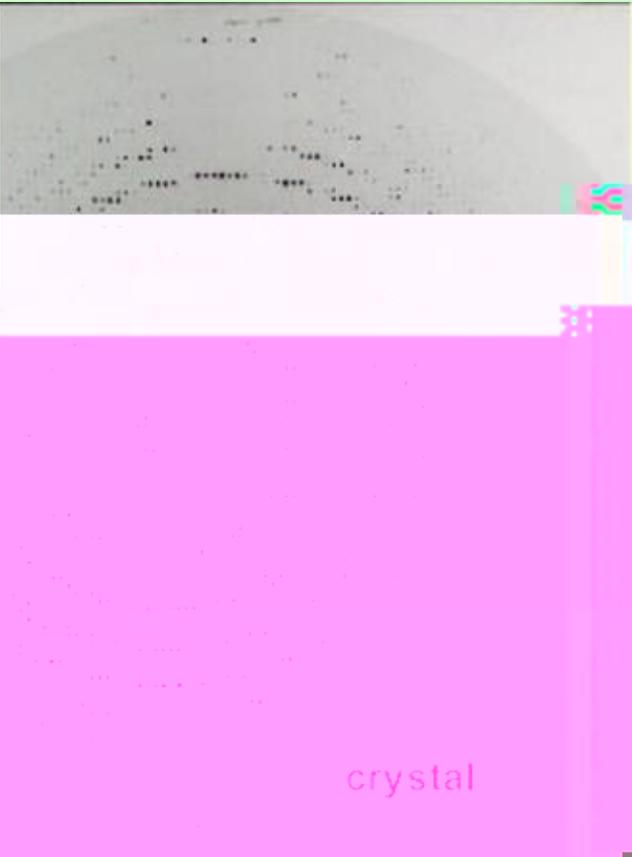
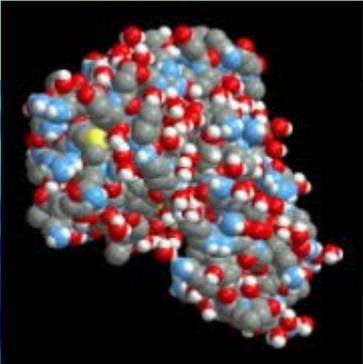
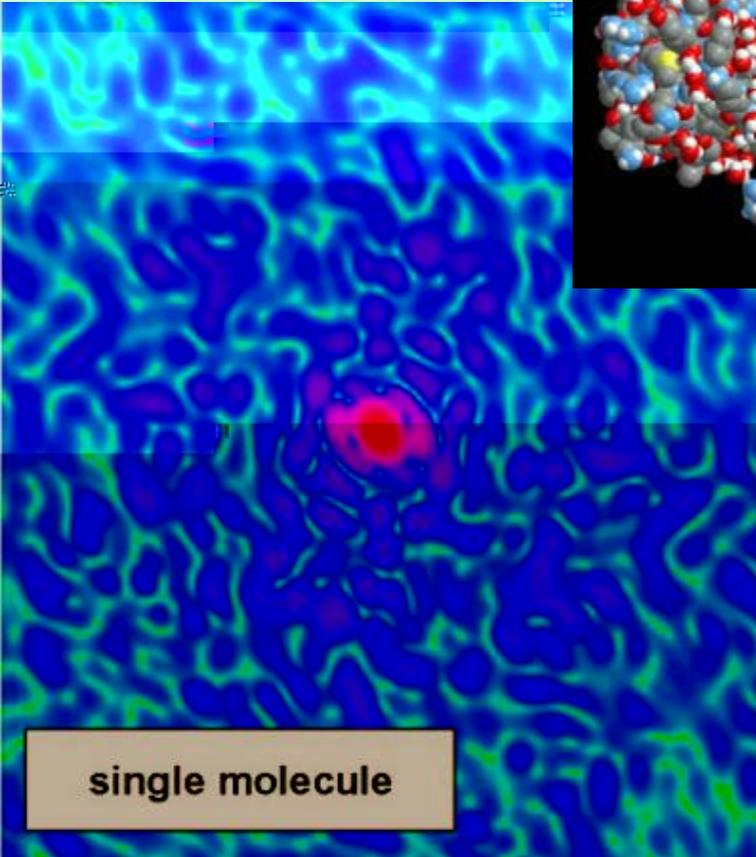
X

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3



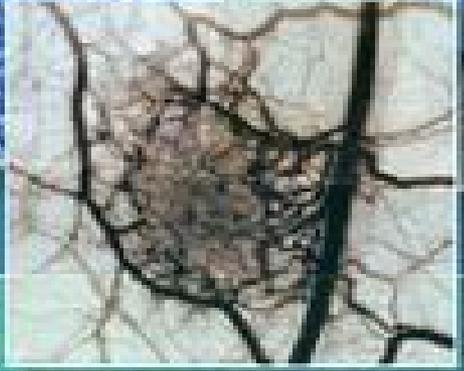
# Lysozyme





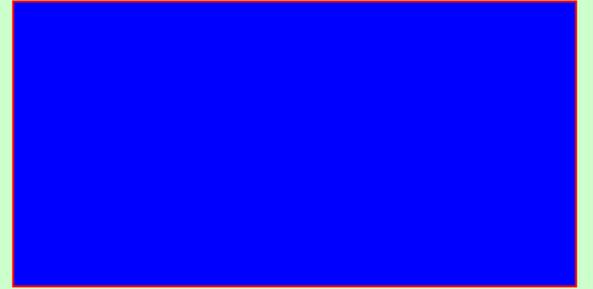
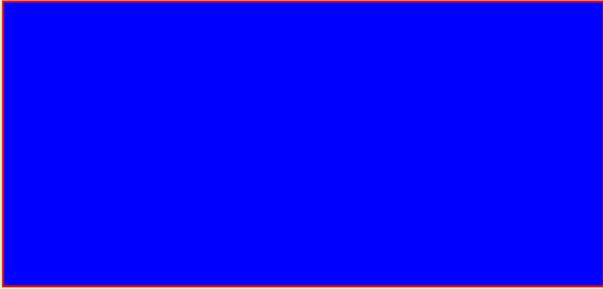
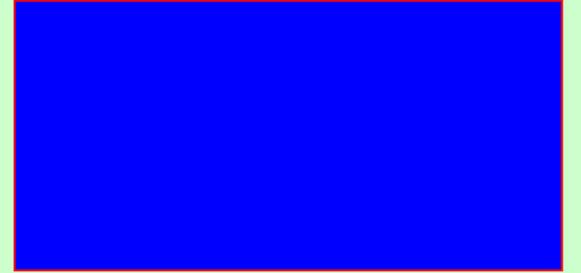
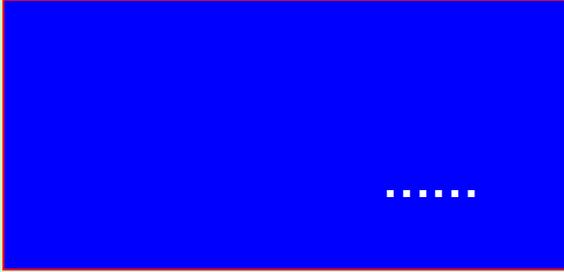
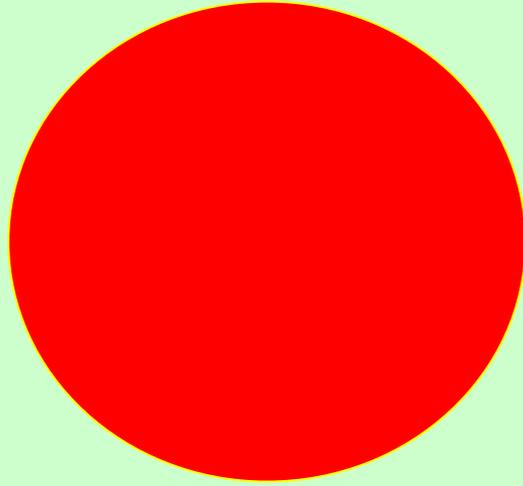
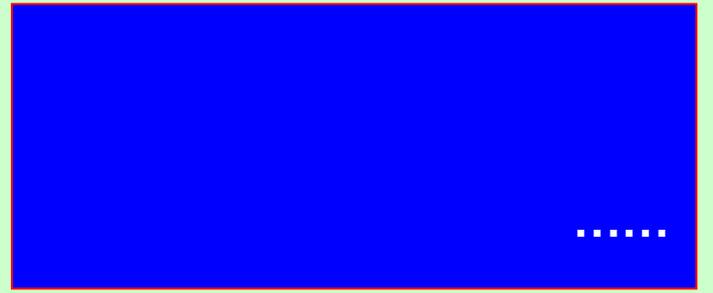
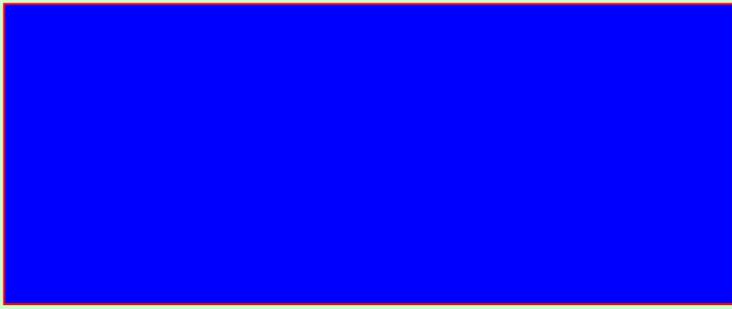
LIGA







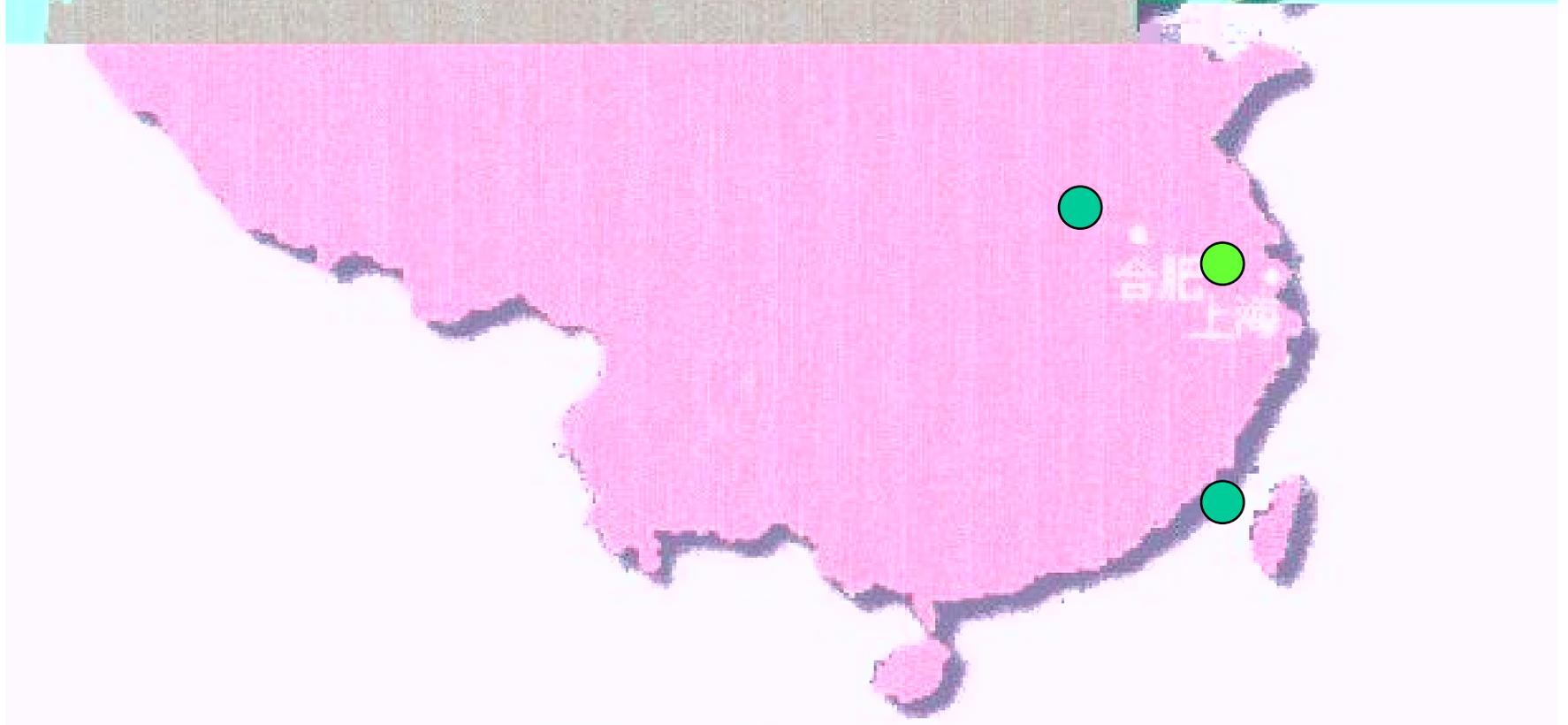


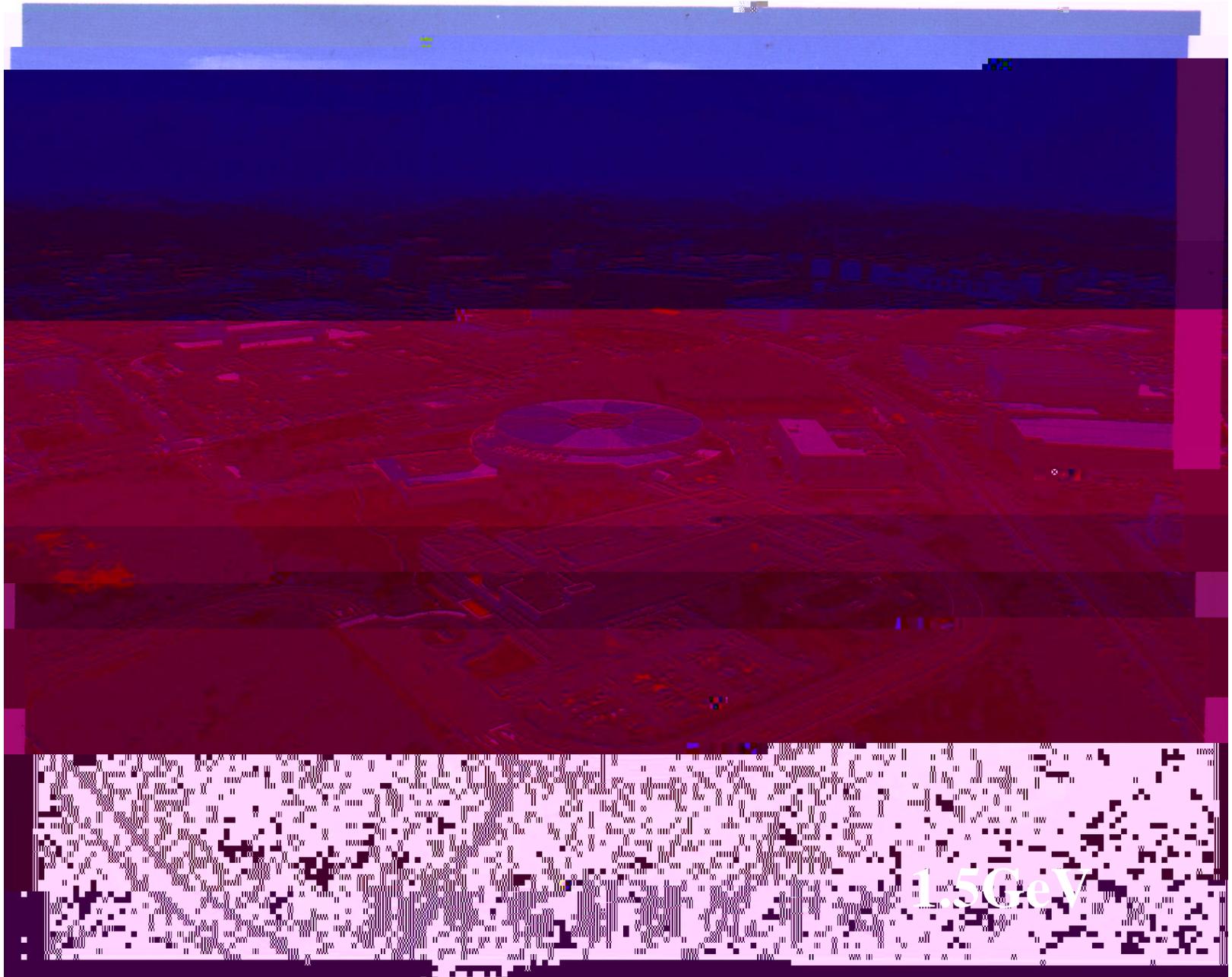




中国科学院高能物理研究所

# Beijing Synchrotron Radiation Facility







(0.8GeV)

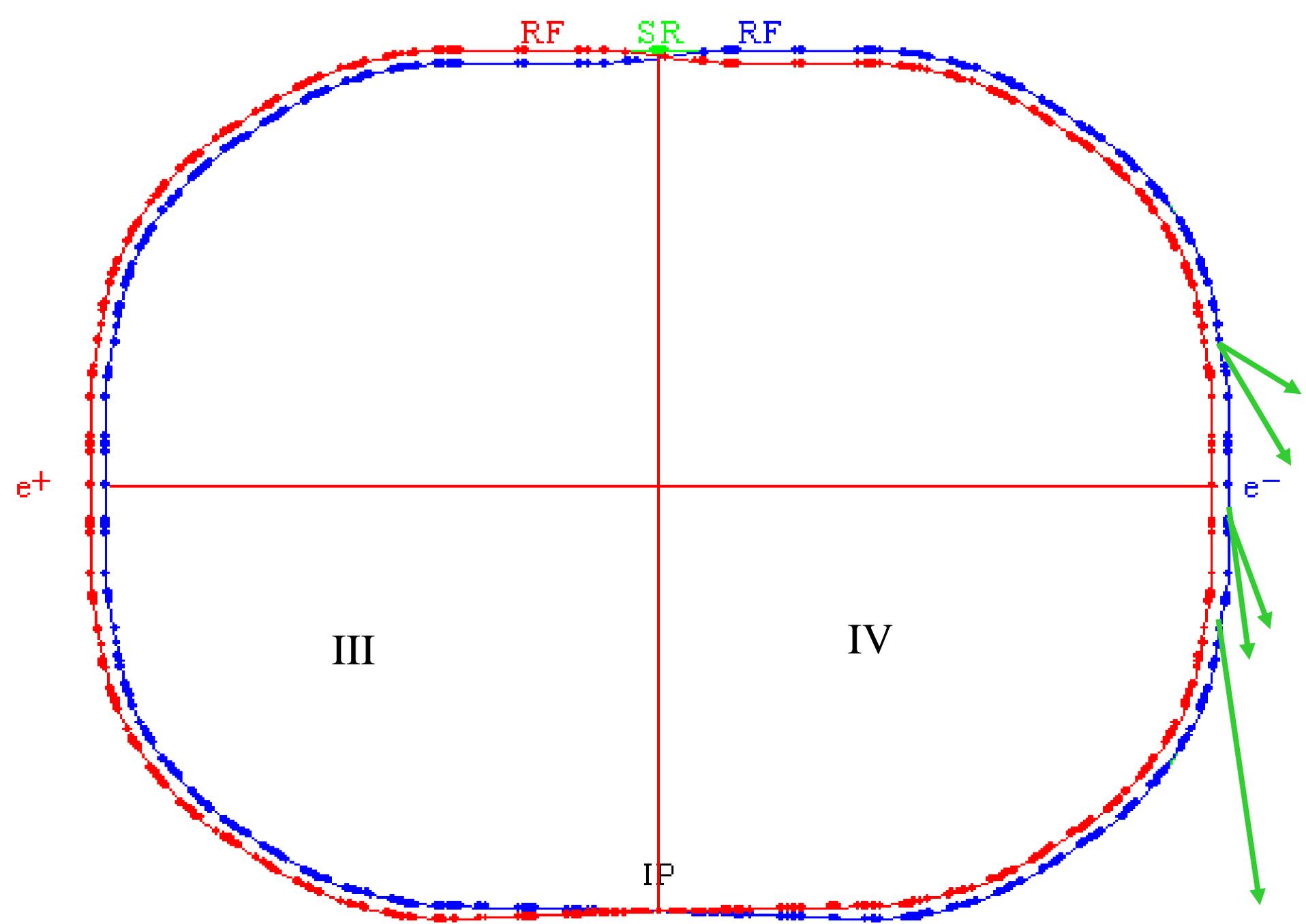




13#

15#

12#





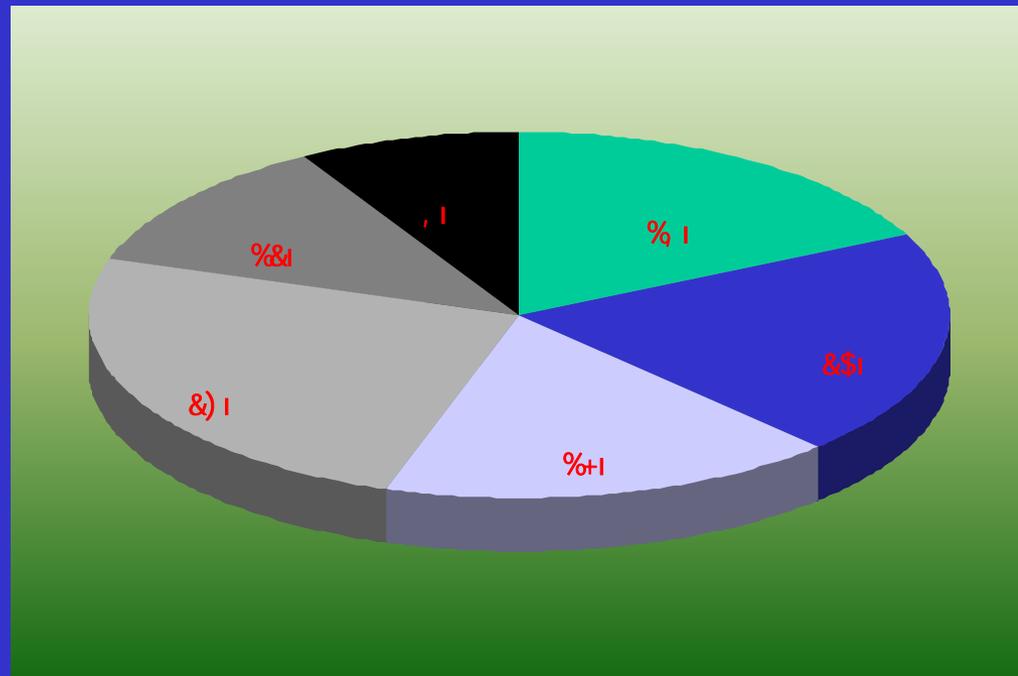
# BEPCII

		BEPC	BEPCII
		2.2 GeV	2.5 GeV
		120 mA	250 mA
		1.8 GeV	1.89 GeV
		40 mA	910 mA

# BSRF

## Map of China

Locations of provinces, autonomous regions and municipalities.



2008 12 25 2009 1 20

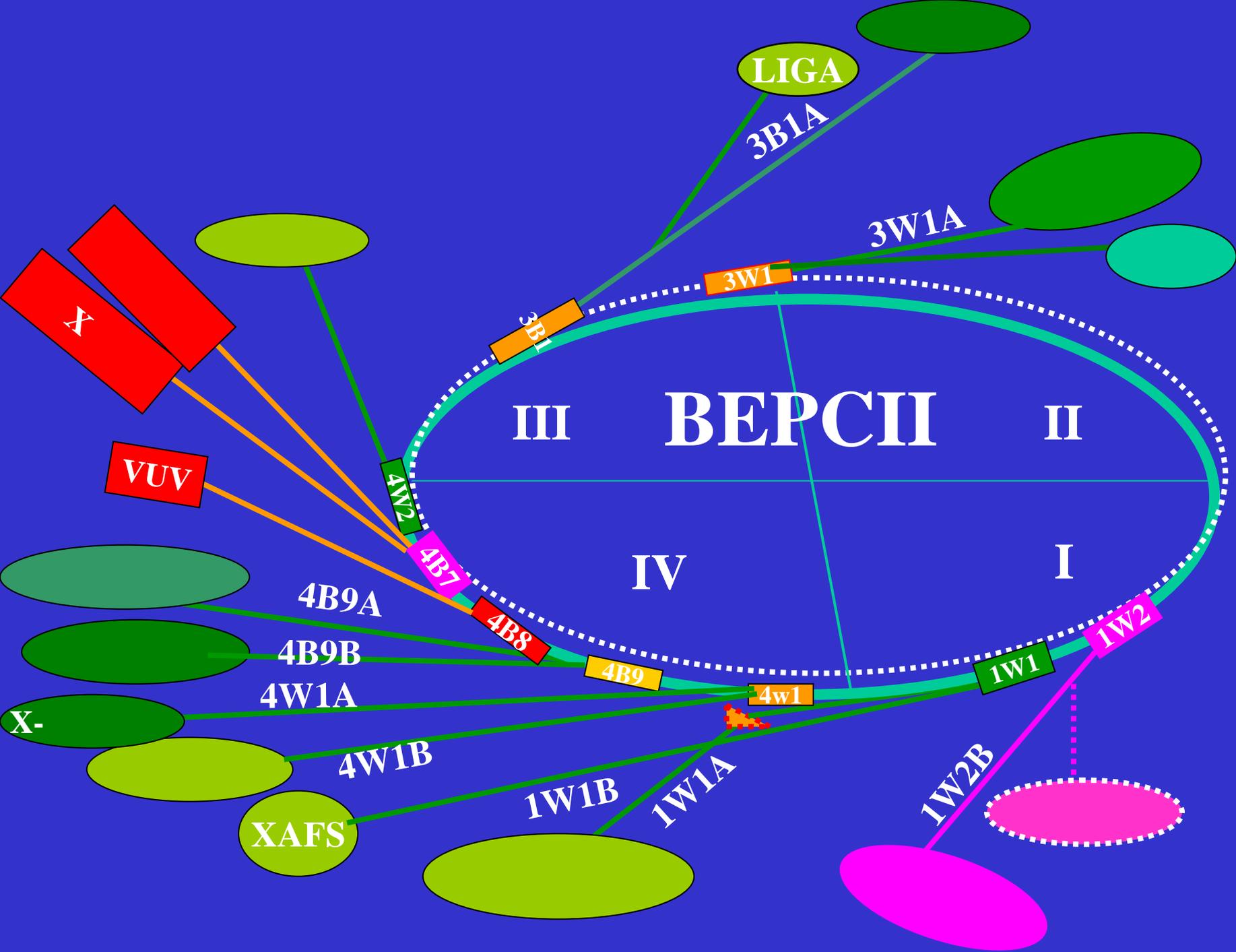
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88

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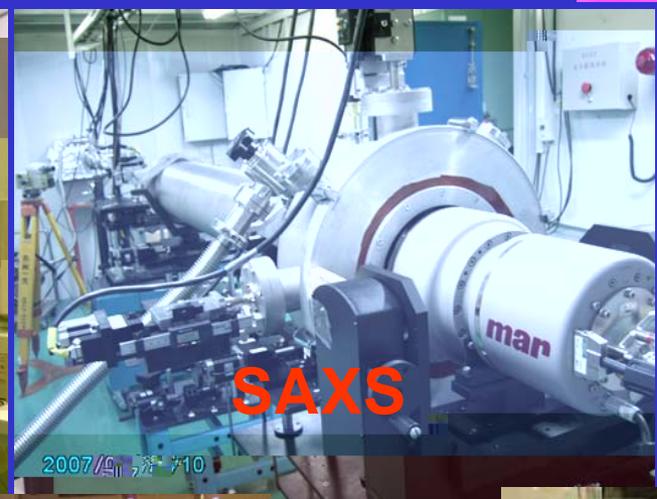
PX

XAFS

SAXS

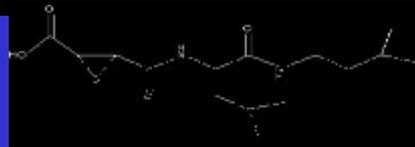
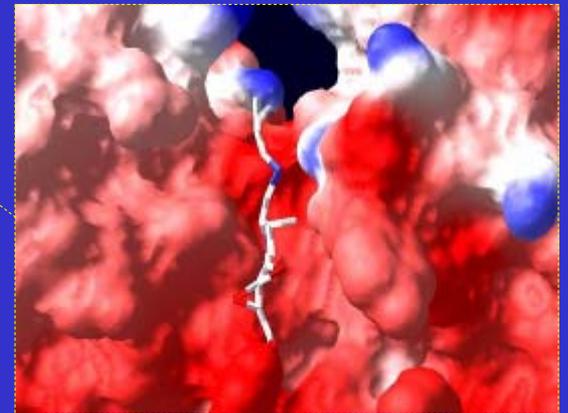
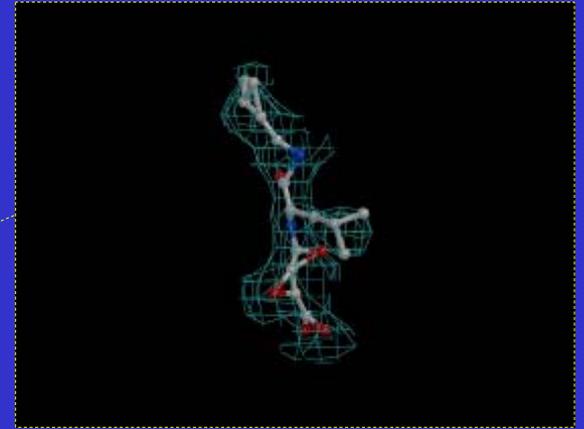
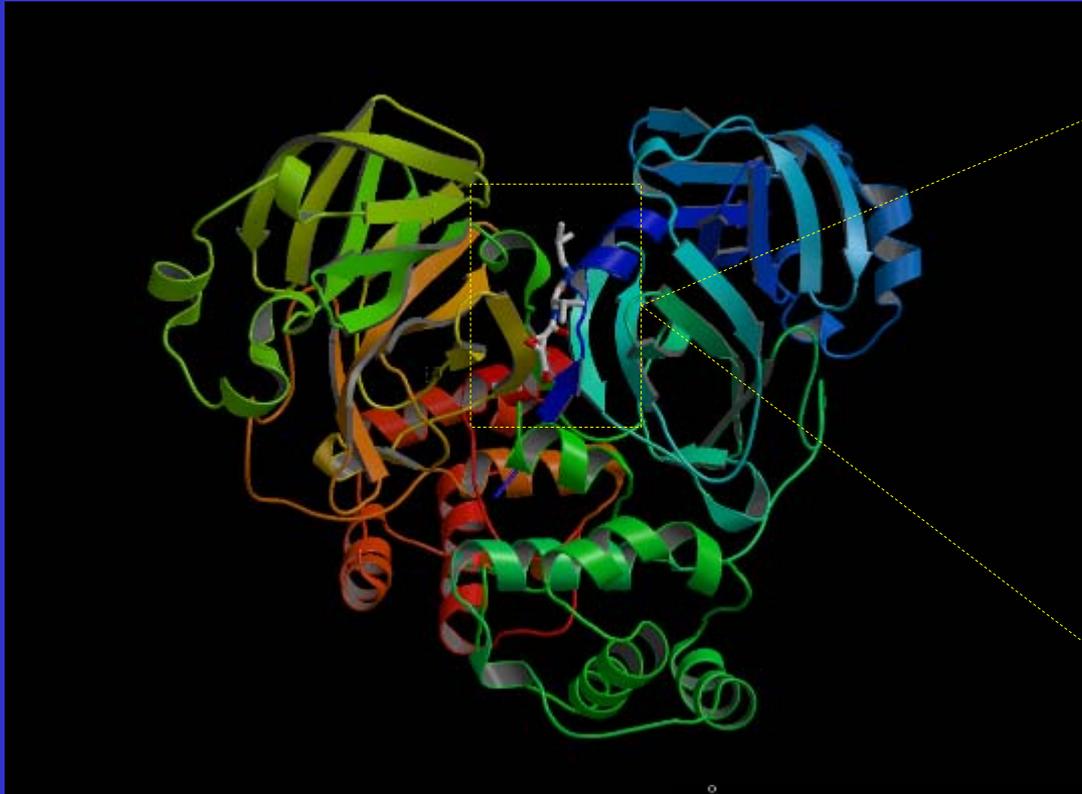
CD

XFL



# SARS

## SARS-CoV M<sup>pro</sup>



SARS-CoV M<sup>pro</sup>

18 March 2004

International weekly journal of science

# nature

www.naturejpn.com

## Power plant

Structure of a spinach light-harvester

### Ancient climate

Recipe for a snowball Earth

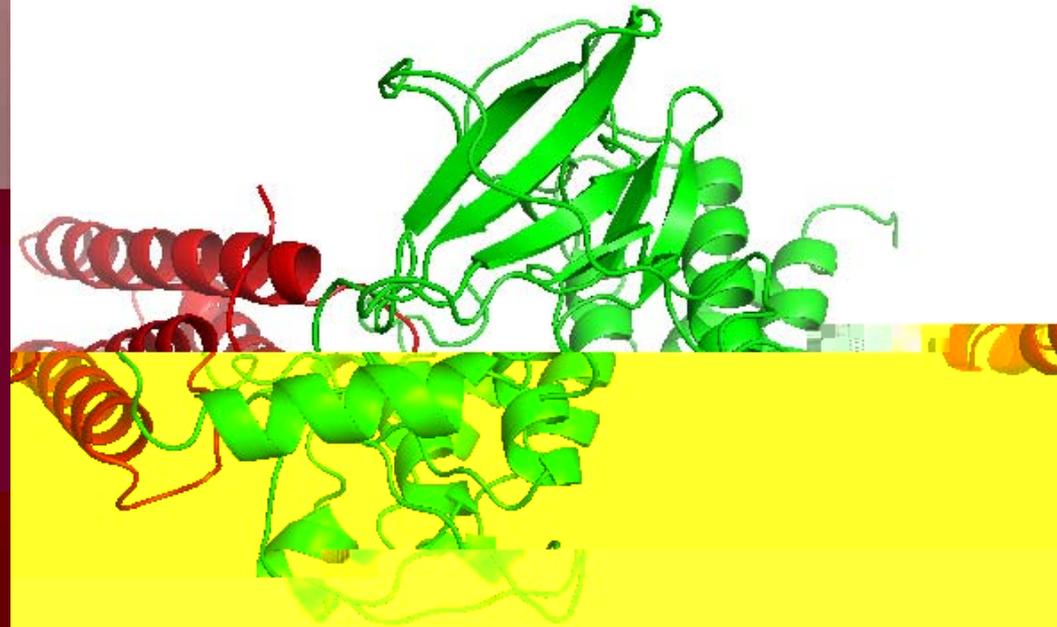
### The science of dieting

Hungry for facts

### Prion infectivity

Testing the protein-only hypothesis

# AvrPto-Pto



naturejobs anticancer drugs



3d

2004

Nature, 449, 243 - 247 ( 2007)



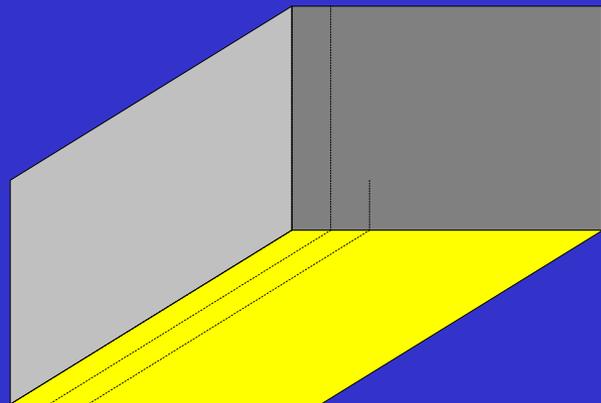
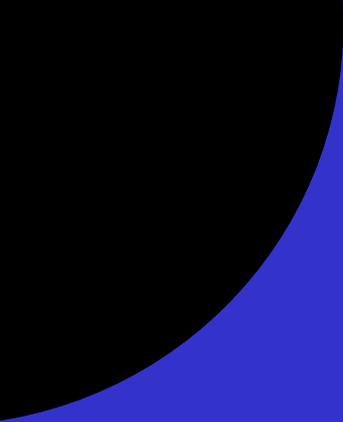
- **XAS** X-ray Absorption Structure

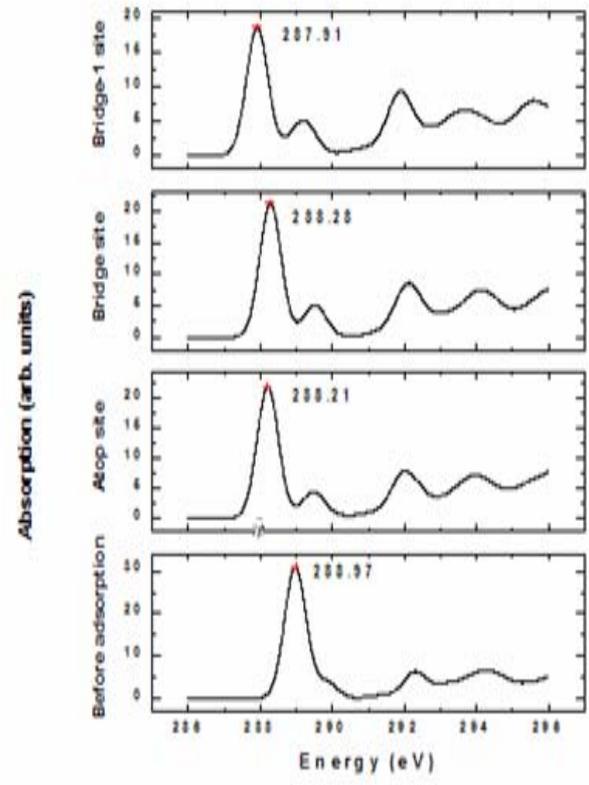
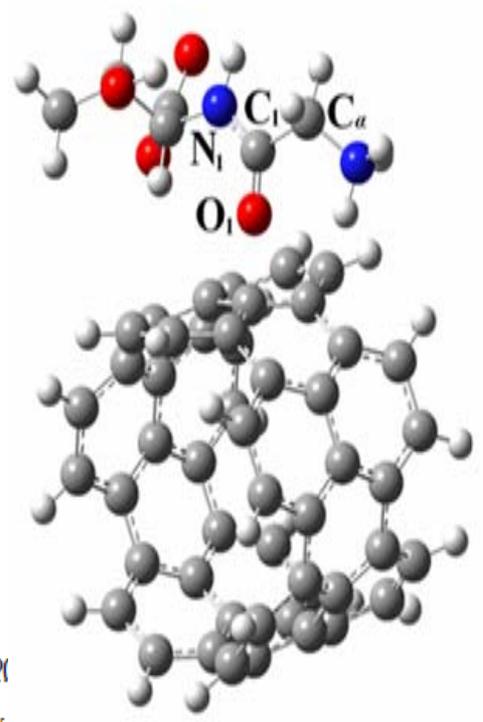
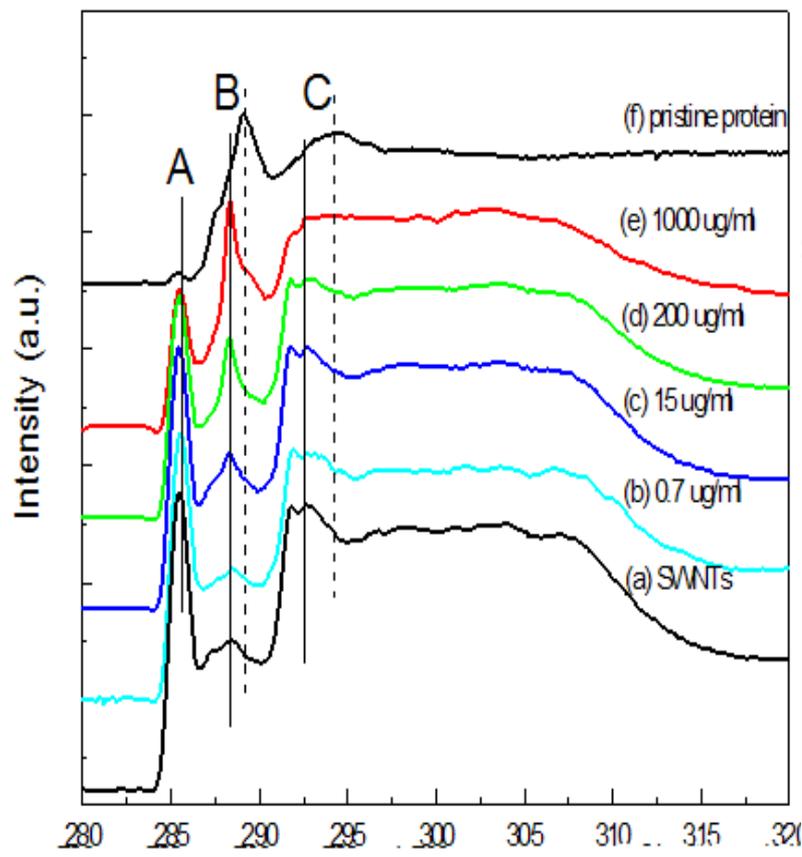
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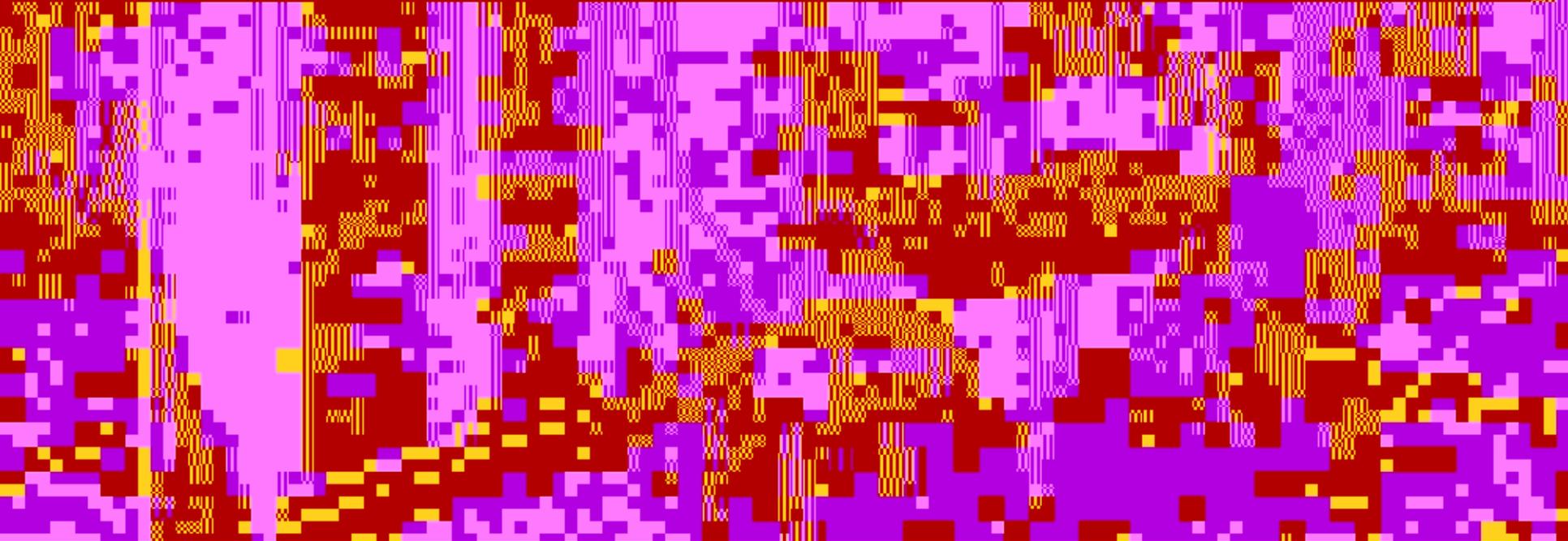
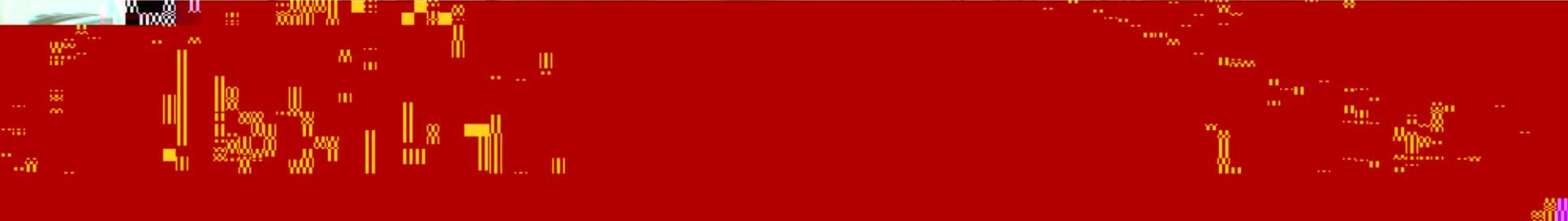
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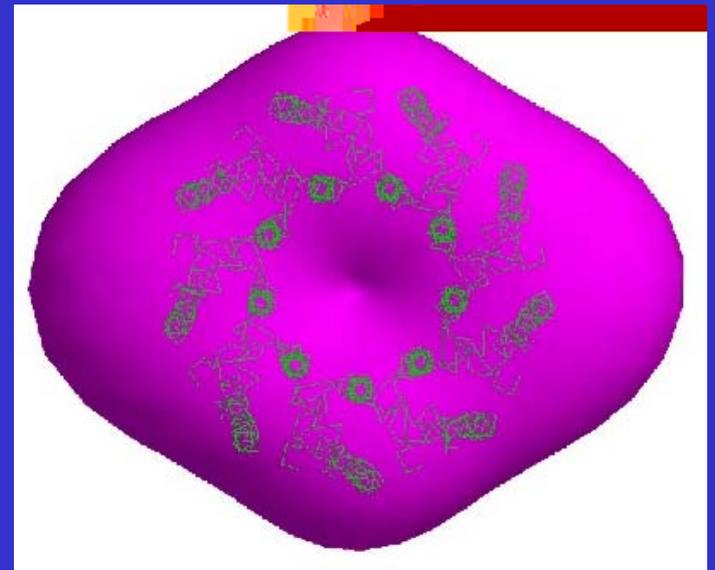
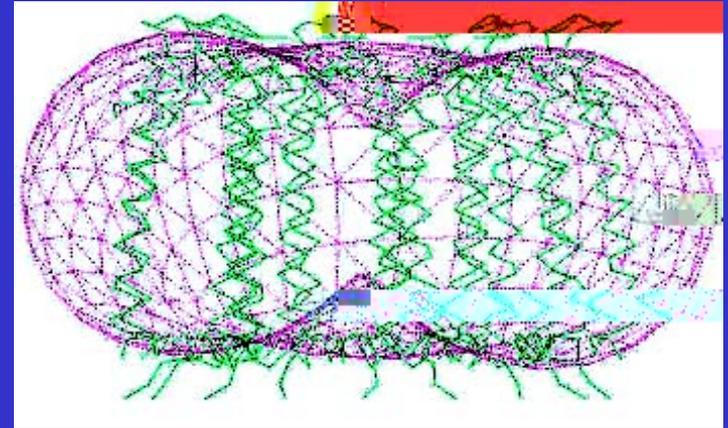
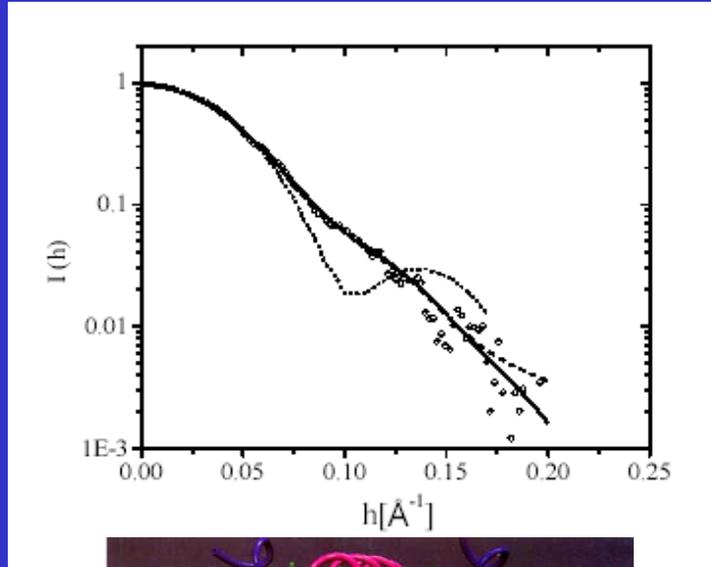


X

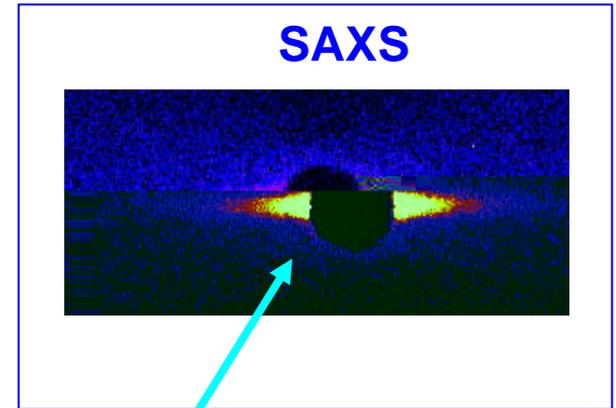
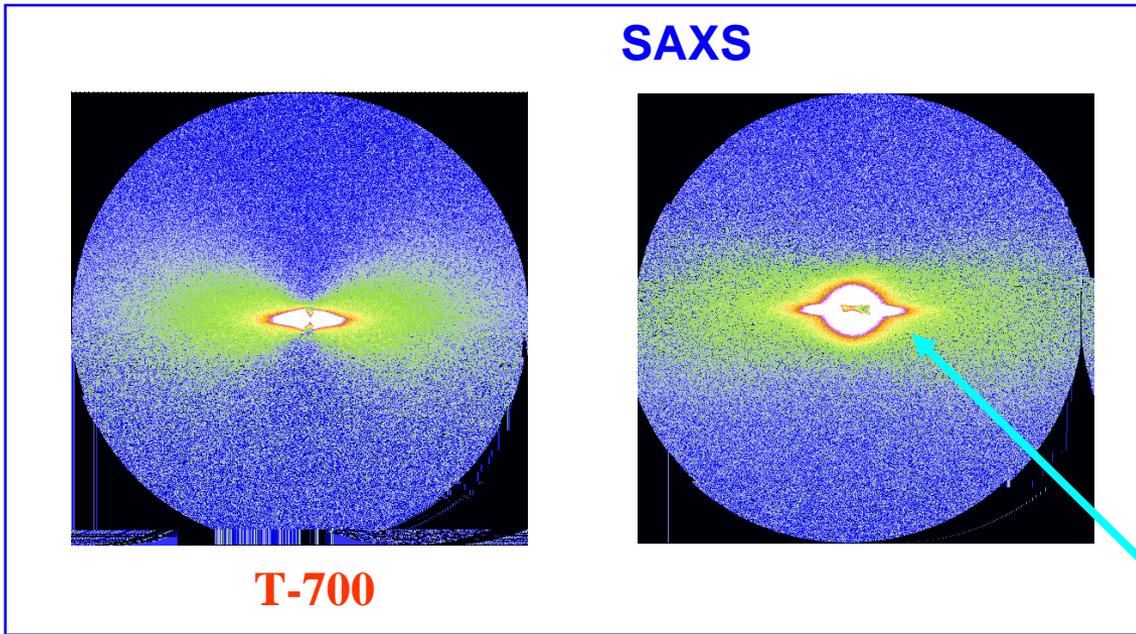




# LH2



# SXAS



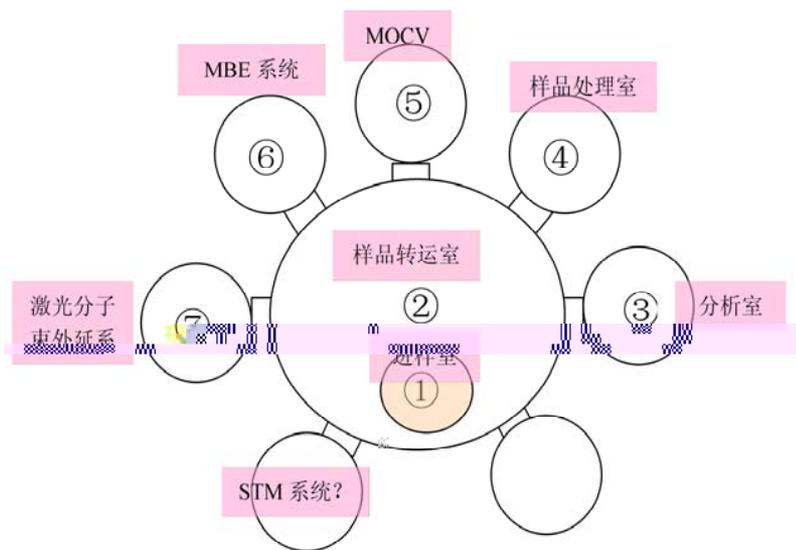
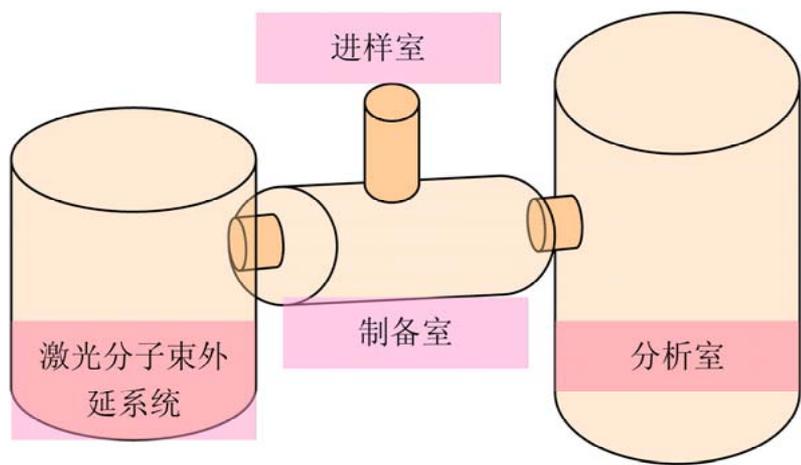
## SAXS

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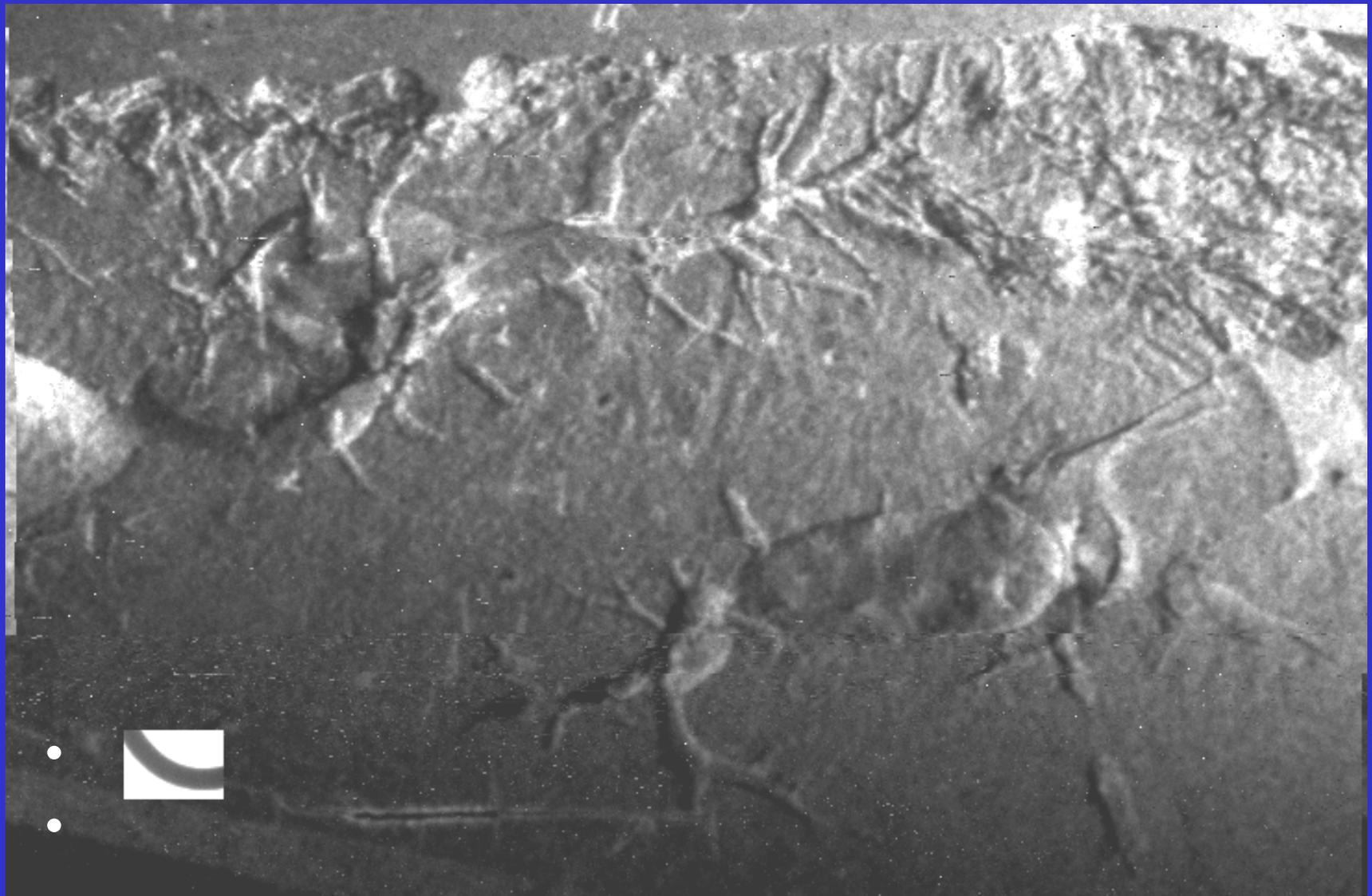
$0.07^\circ \ll$

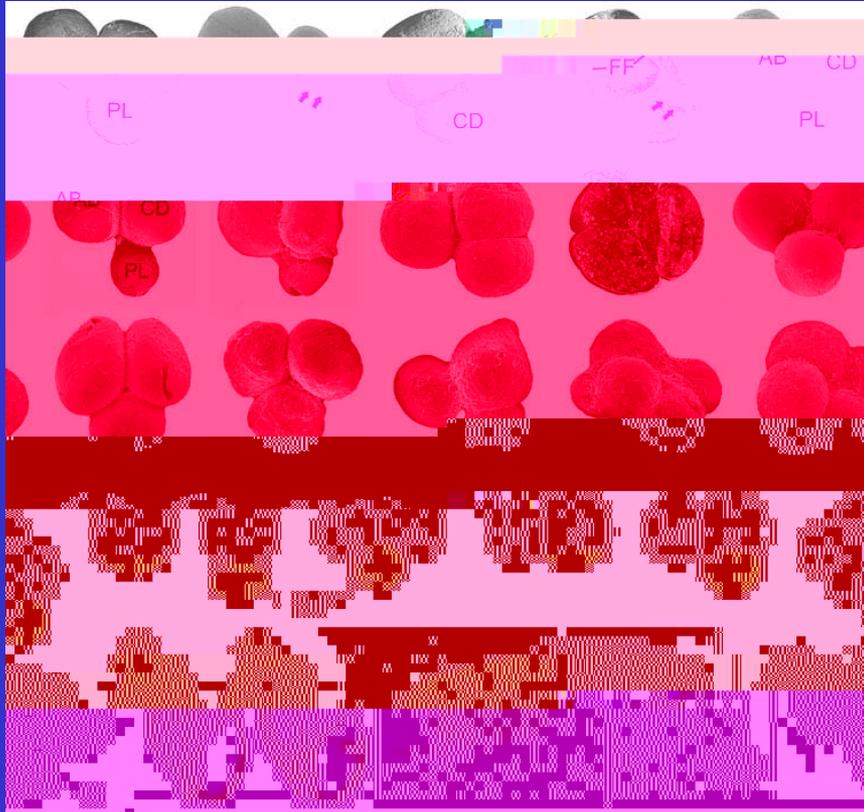
SAXS  $0.154^\circ$

SAXS





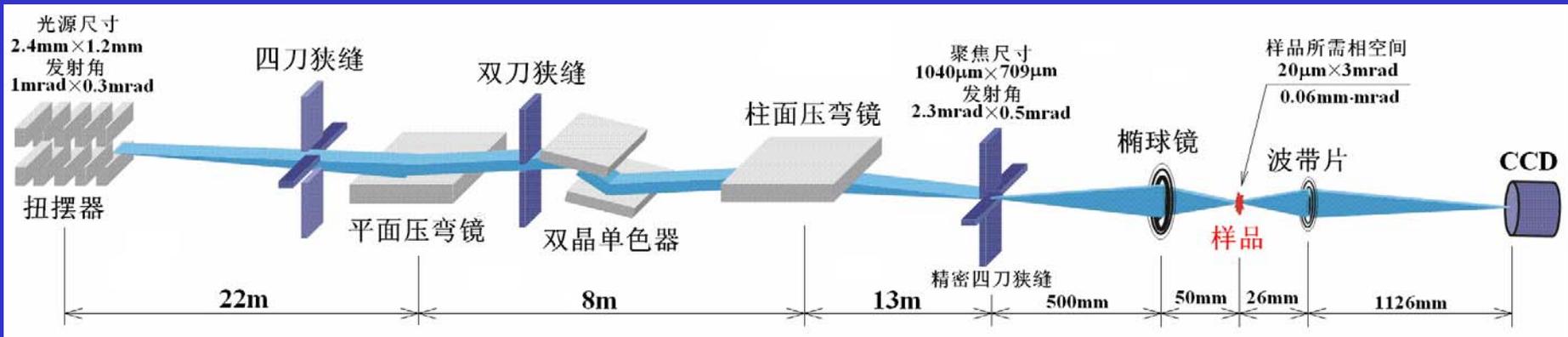






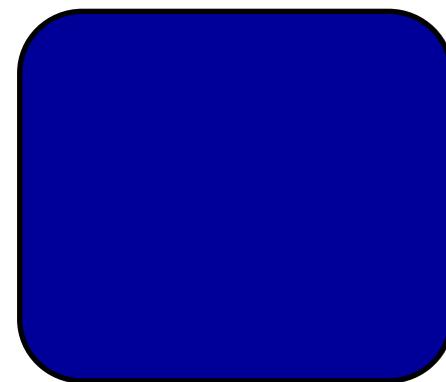
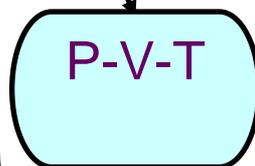
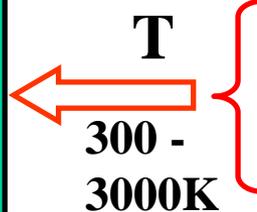
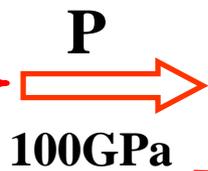
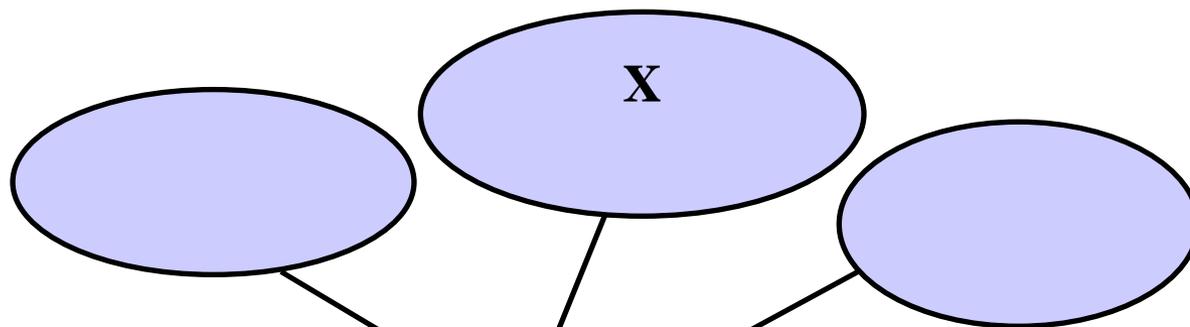
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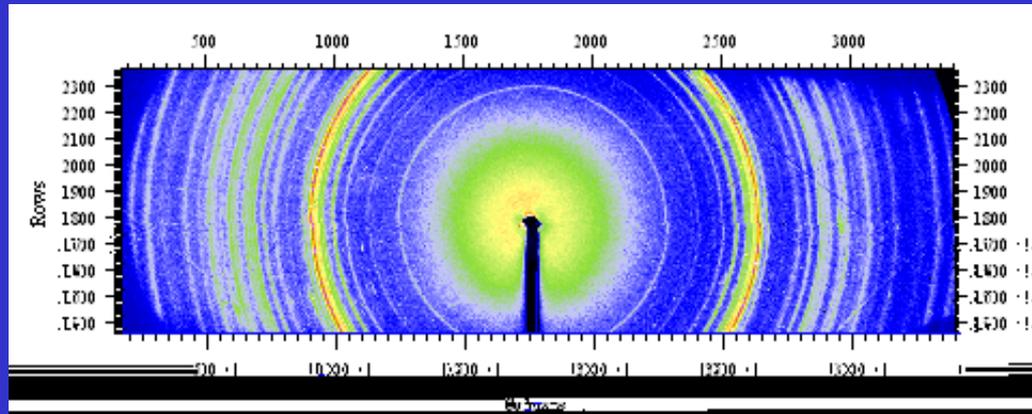
X





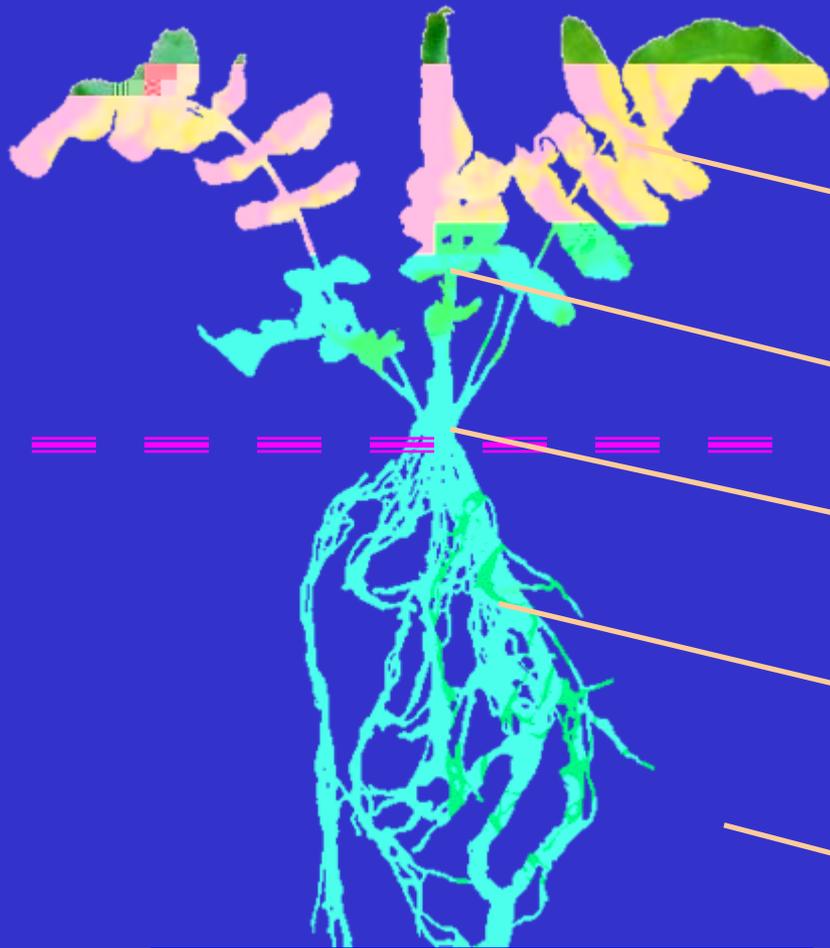
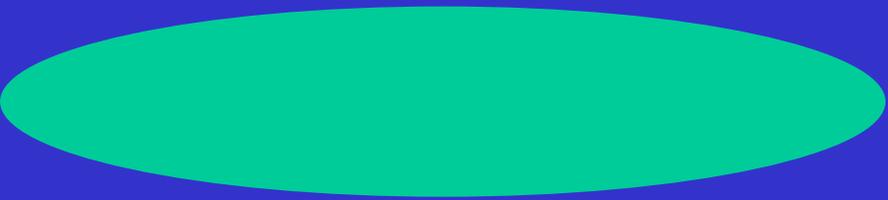
极端条件



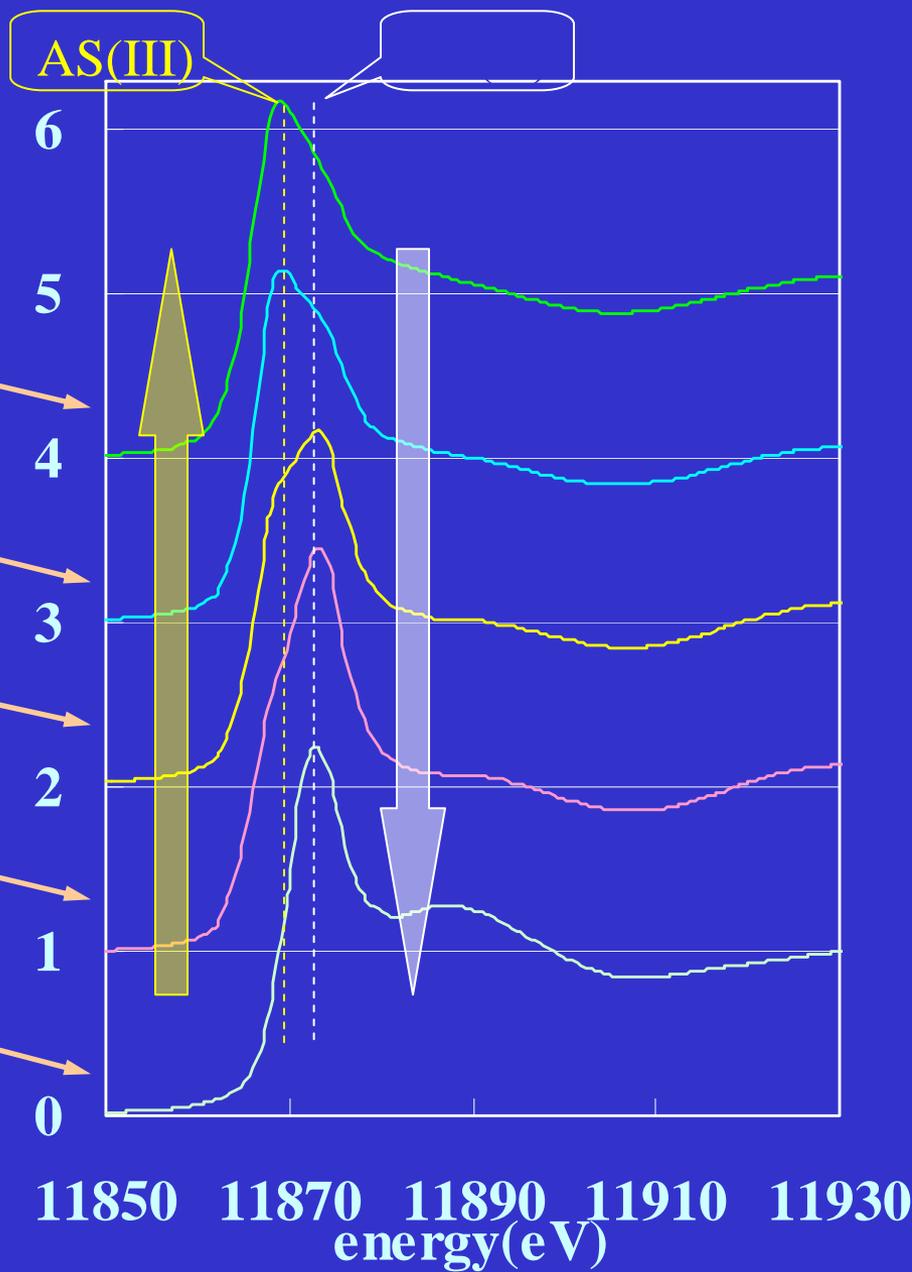


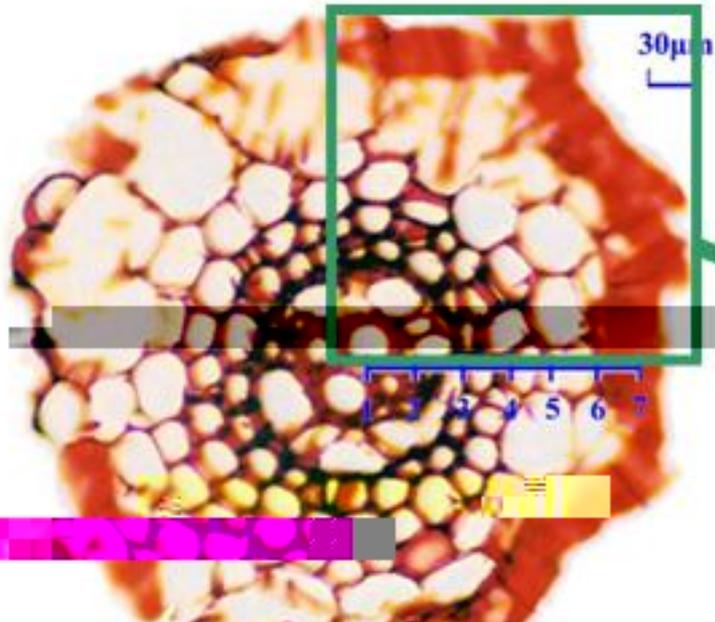
1000K

62 GPa

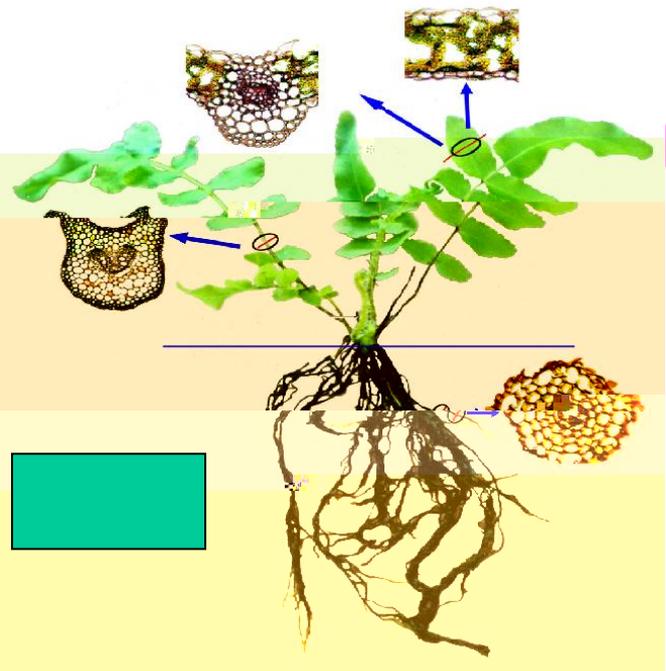
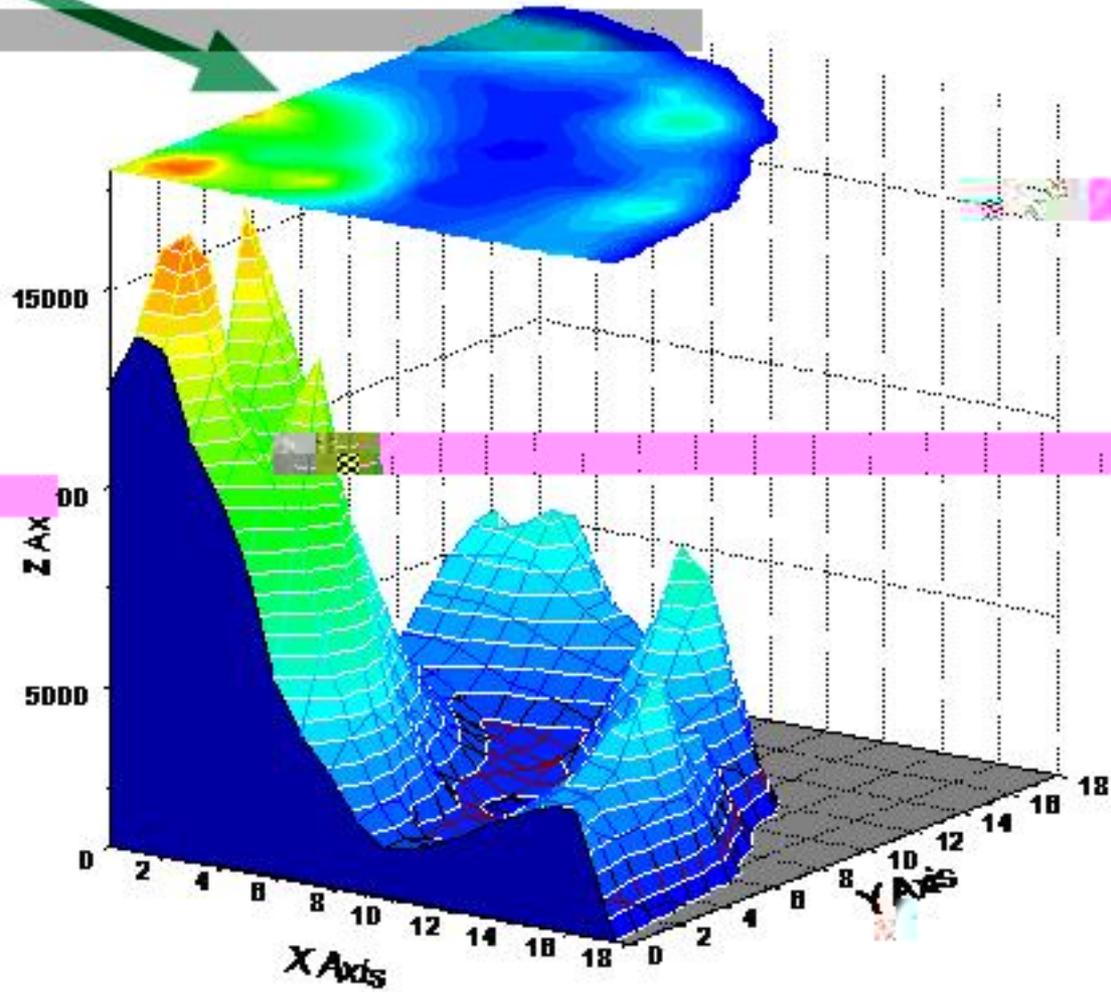


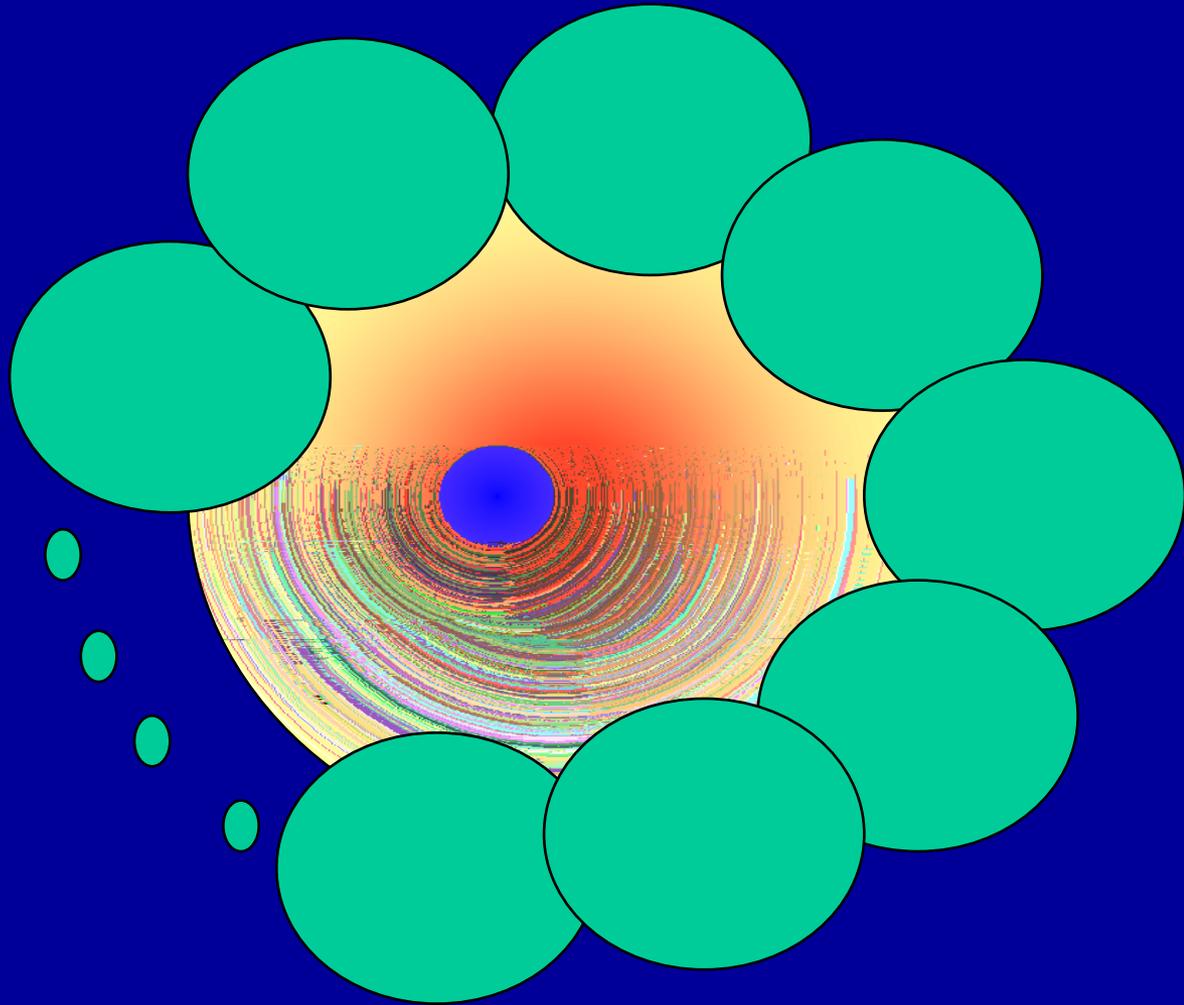
$As(V) \rightleftharpoons As(III)$





● X





**BSRF**

