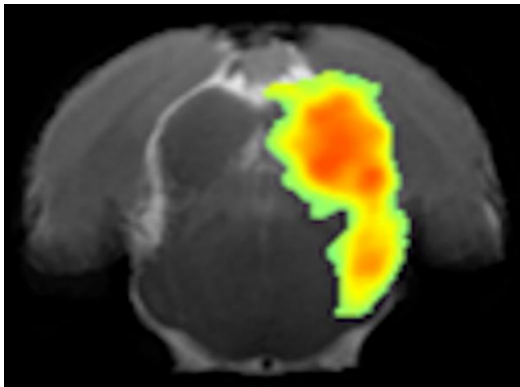


Physics Spots Pneumonia and other Medical Applications

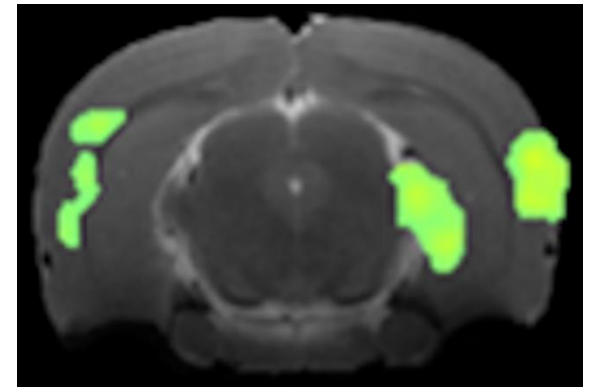


Condon LAU (劉康德)

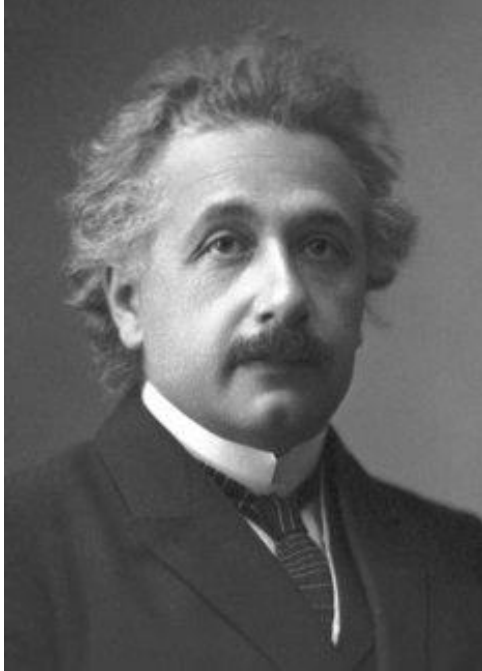
Associate Professor

City University of Hong Kong

condon.lau@cityu.edu.hk

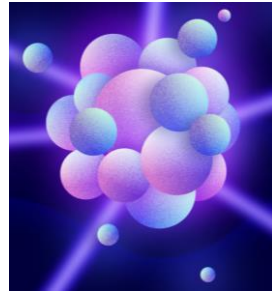


Introduction



[nobelprize.org](https://www.nobelprize.org)

Physics \neq Medicine



[cityu.edu.hk](https://www.cityu.edu.hk)



[bbc.com](https://www.bbc.com)



[health.gov](https://www.health.gov)

Physics is integral to modern medicine!

Outline

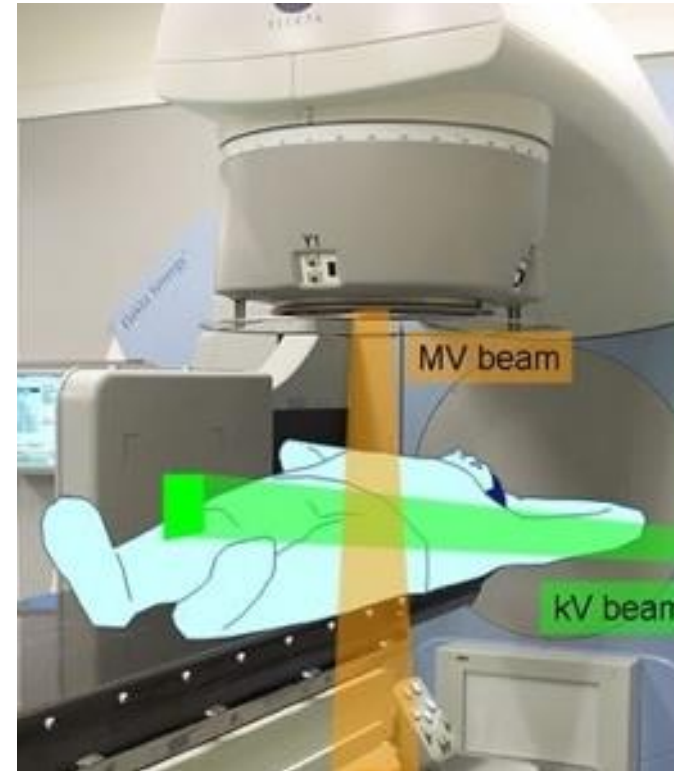
Modern medical equipment is based on important physical laws

Imaging (影像)



radiopedia.org

Radiotherapy (放射治療)



uci.edu

Imaging

Doctors often need to see inside the body.

3 approaches:

1. Exploratory surgery



veterinarypracticenews.com

Imaging

Doctors often need to see inside the body.

3 approaches:

2. Endoscopy



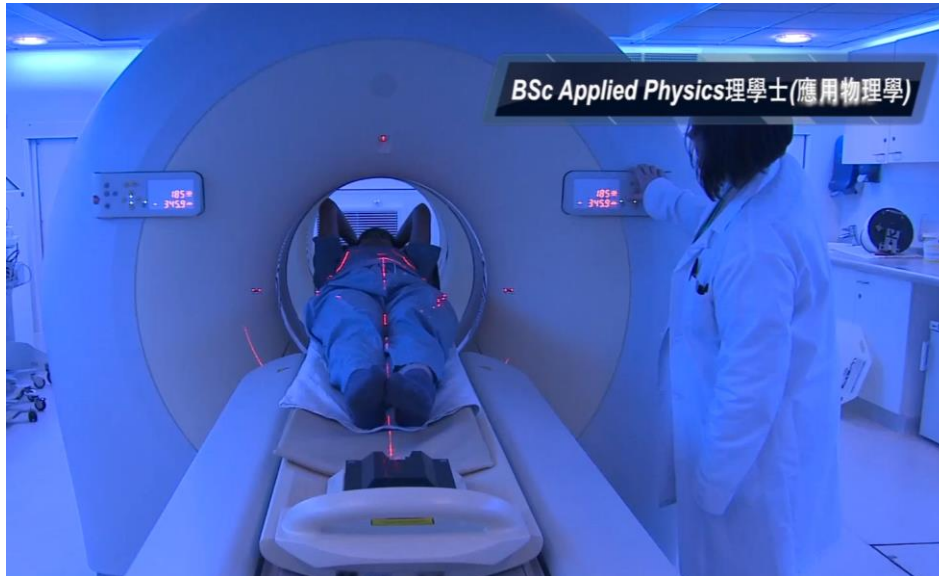
nrmchealth.com

Imaging

Doctors often need to see inside the body.

3 approaches:

3. Imaging



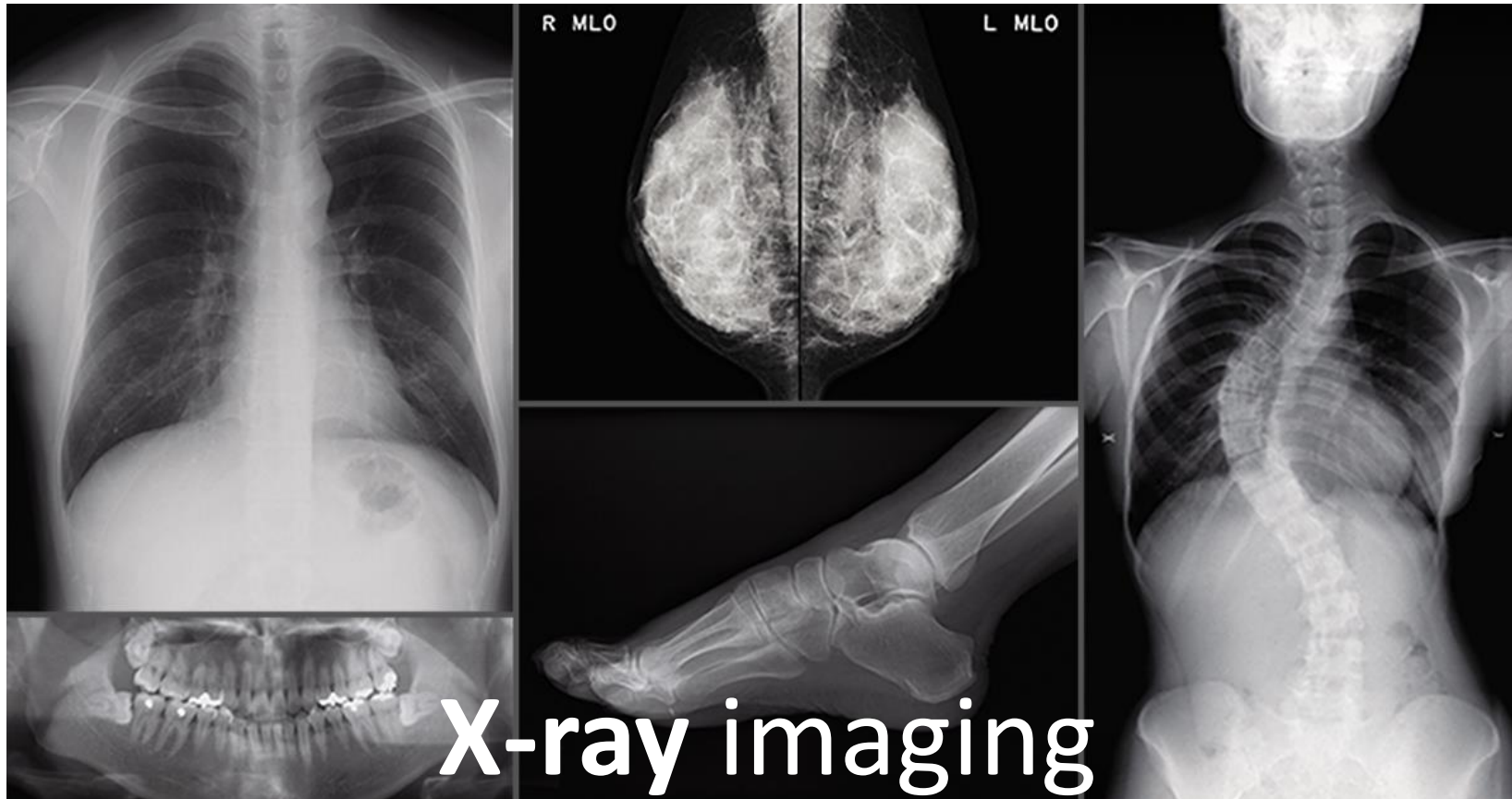
cityu.edu.hk



um.edu.my

Imaging

Imaging technology uses advanced physics



fujifilm.com

Imaging

Imaging technology uses advanced physics



Magnetic resonance imaging (MRI)

openmedscience.com

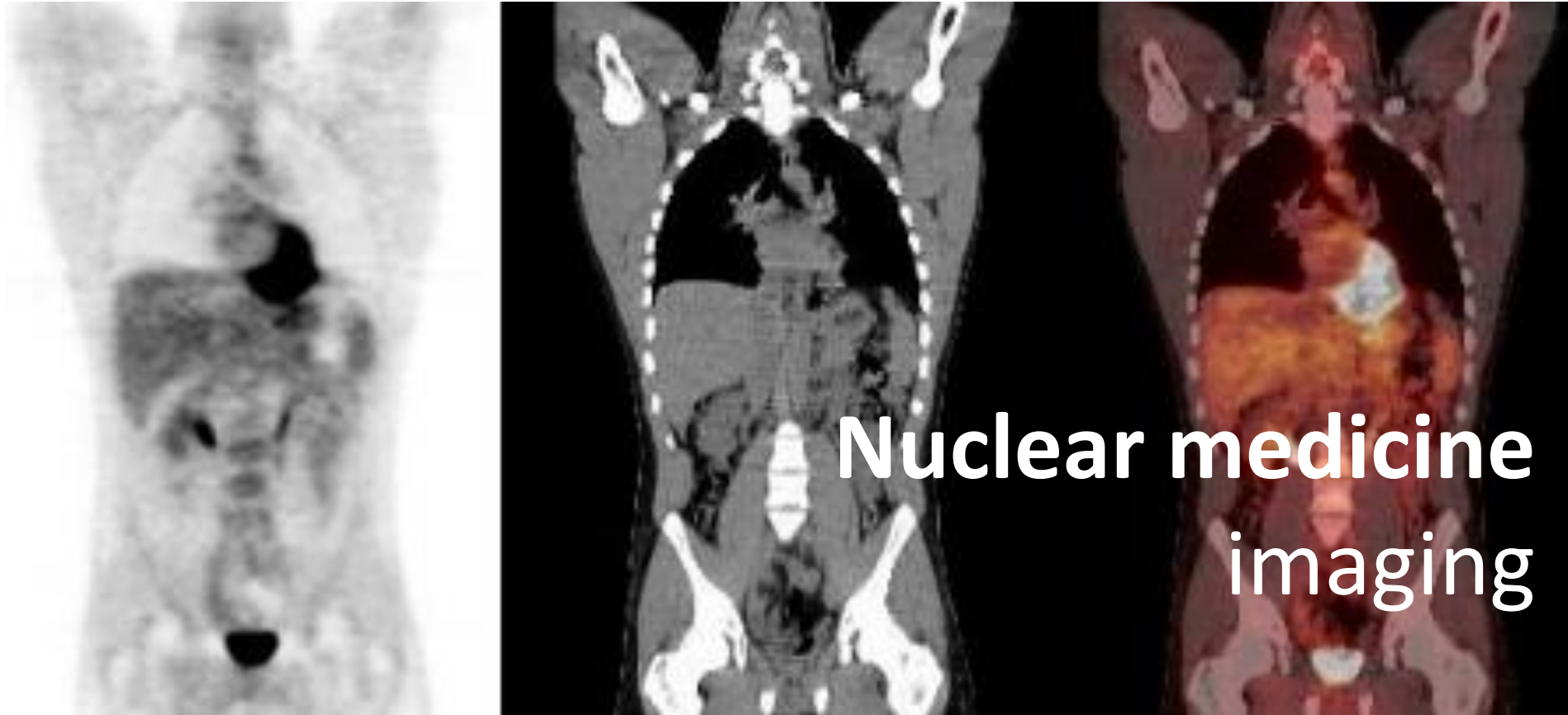
Imaging

Imaging technology uses advanced physics



Imaging

Imaging technology uses advanced physics



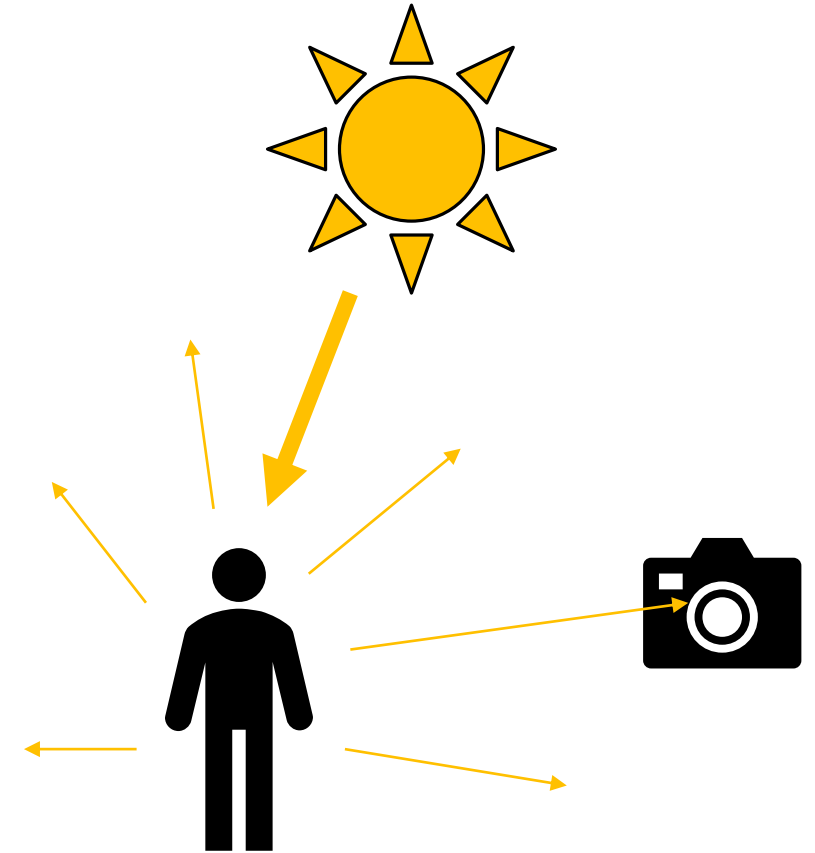
stanfordhealthcare.org

Imaging

X-ray imaging similar to digital photography



pexels.com

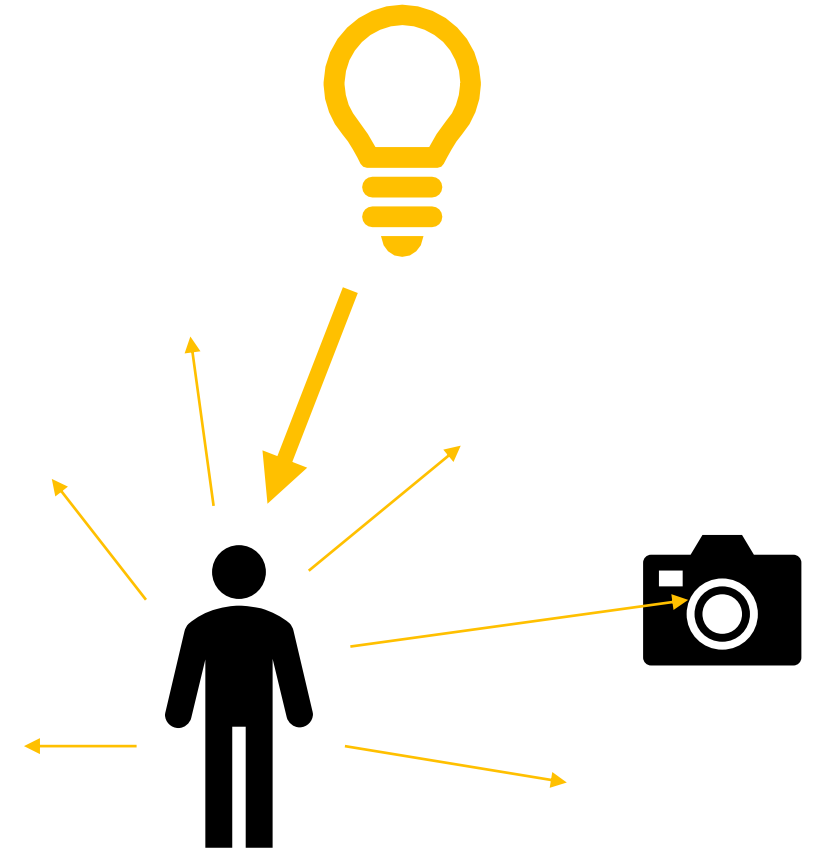


Imaging

X-ray imaging is like flash photography

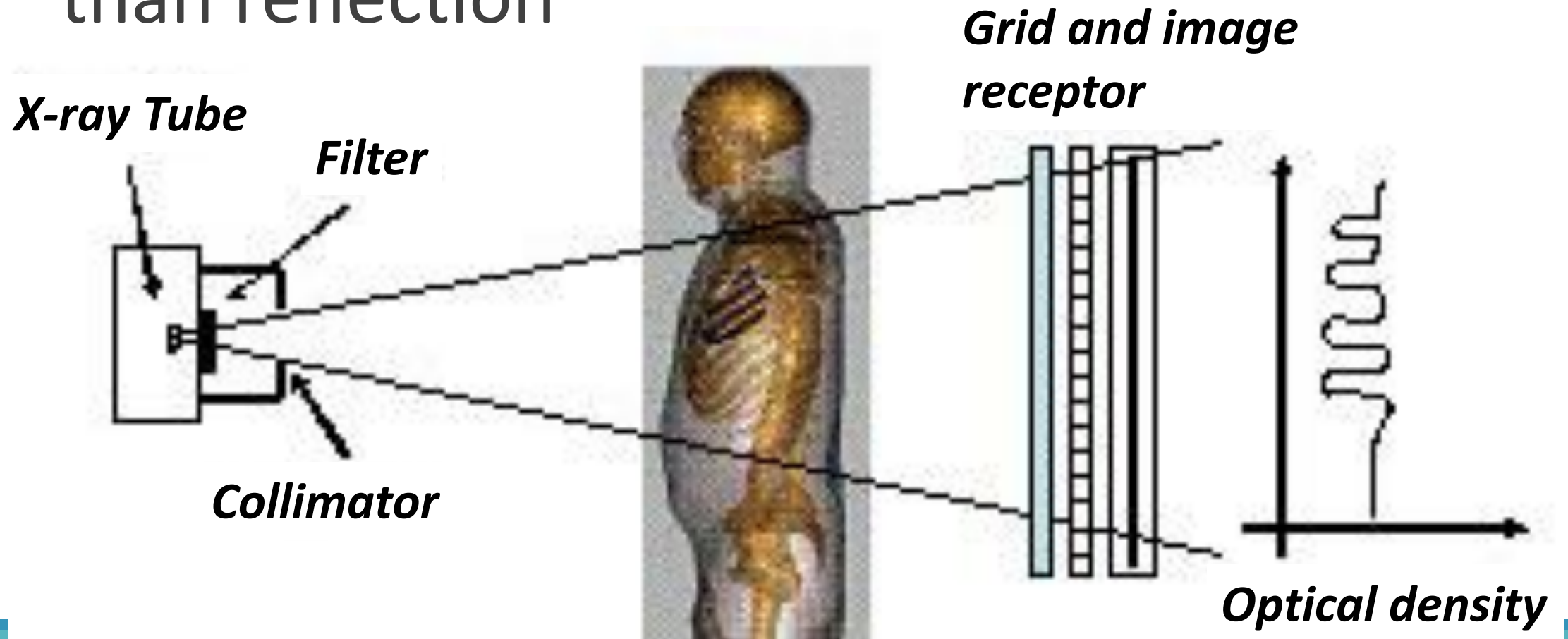


oxfordschoolofphotography.co.uk



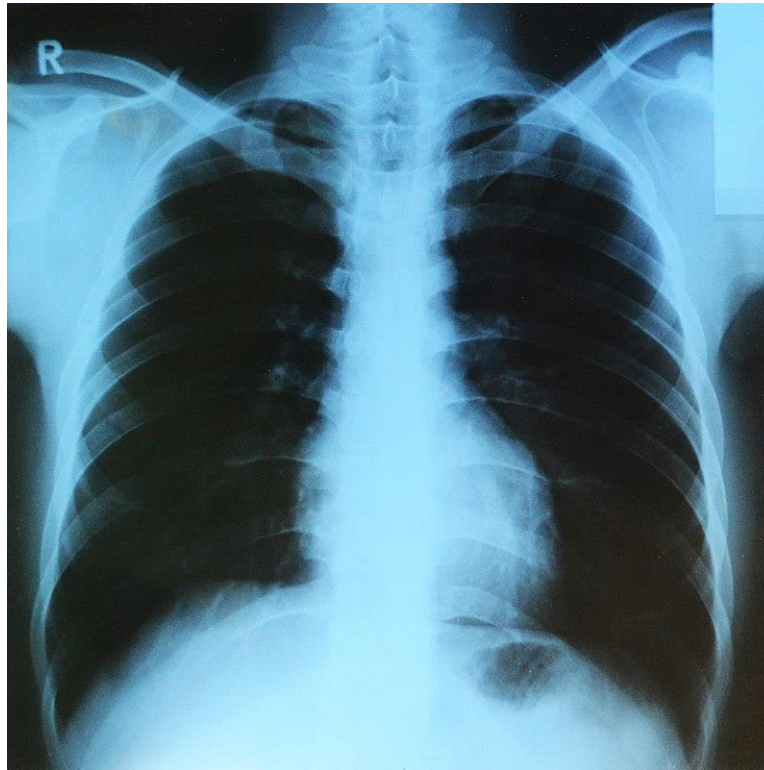
Imaging

X-ray imaging relies on transmission rather than reflection



Imaging

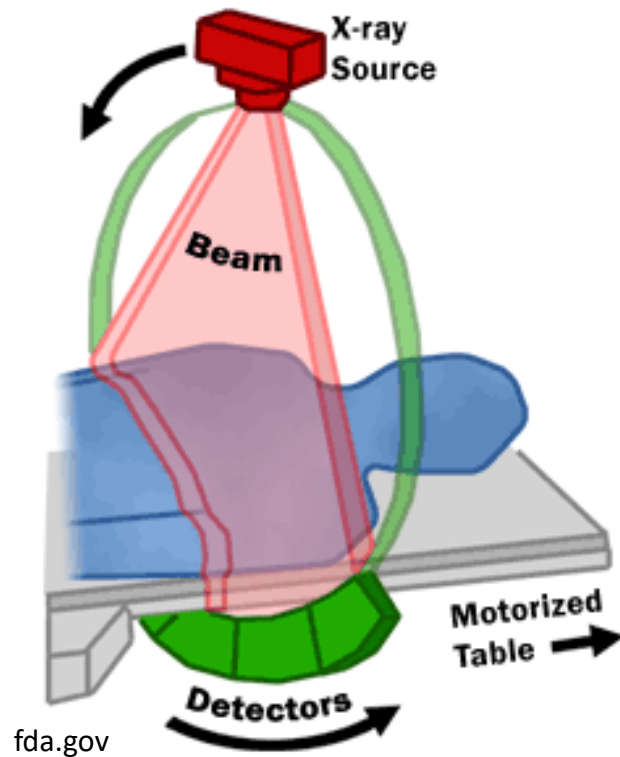
X-ray imaging relies on transmission rather than reflection



<https://commons.wikimedia.org/w/index.php?curid=75028598>

Imaging

3D x-ray imaging known as Computed Tomography (CT)



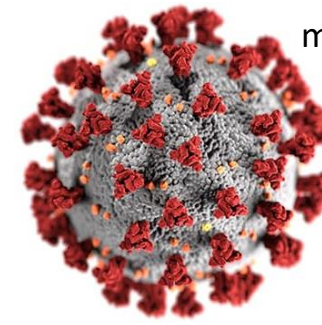
Life Bridge Health

Imaging

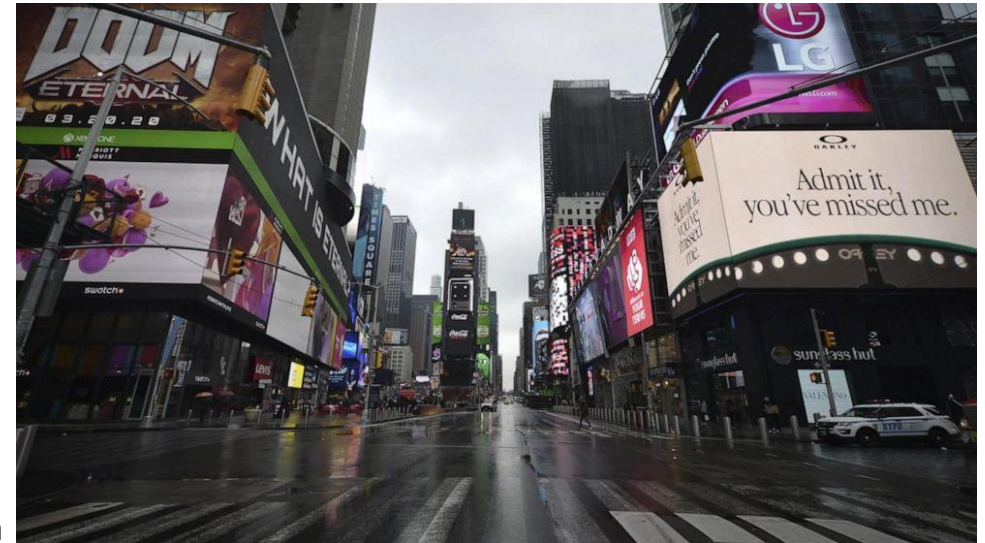
Symptoms of coronavirus disease 2019 (COVID-19, 新冠肺炎):

- Fever
- Cough
- Shortness of breath

Pneumonia



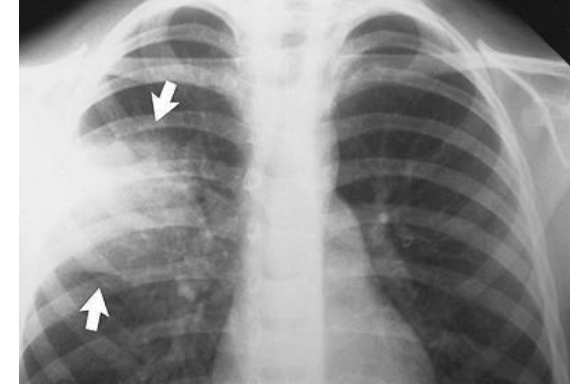
massgeneral.org



abcnews.go.com

Imaging

- Chest x-ray for pneumonia.
- Pneumonia results from fluid accumulation in lungs.
- Fluid absorbs x-rays more than air.
- Opaque areas on chest x-ray and CTs.



mayoclinic.org



radiopaedia.org

Radiotherapy

~~Cancer~~

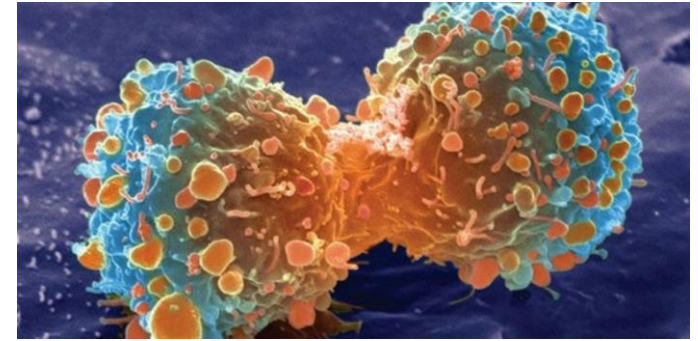
- Radiotherapy is for treating cancer.
- Cancer is one of the leading causes of death.



Radiotherapy

Cancer treatment options:

Surgery



thescientist.com

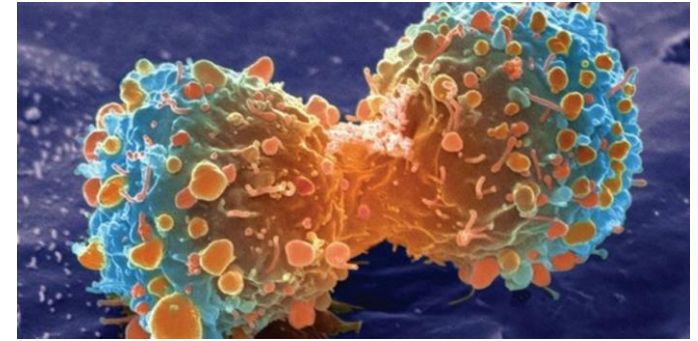


onco.com

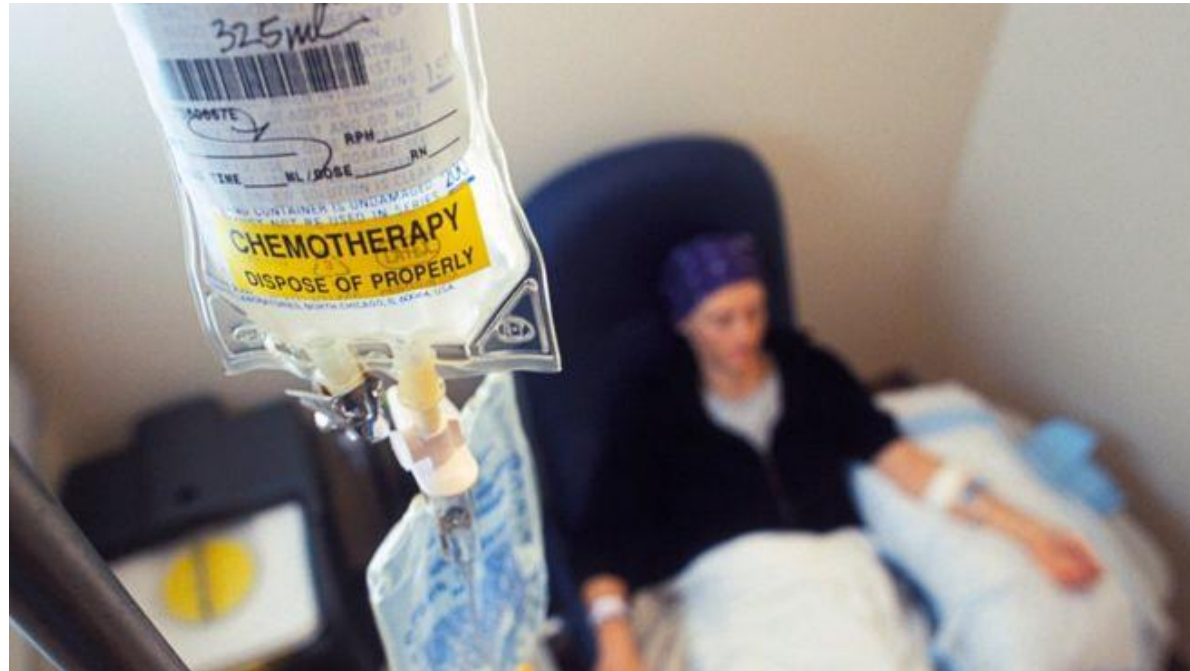
Radiotherapy

Cancer treatment options:

Chemotherapy



thescientist.com

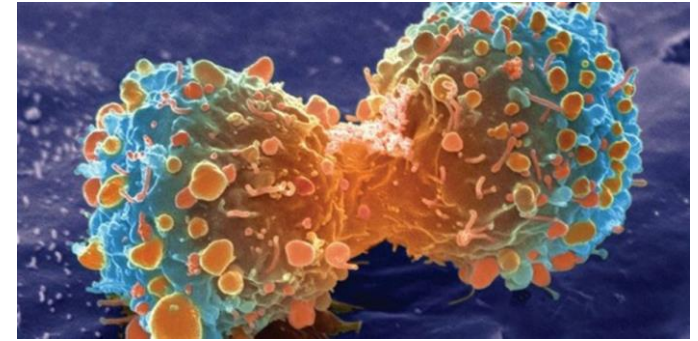


bbc.com

Radiotherapy

Cancer treatment options:

Radiotherapy



thescientist.com



iaea.org

Radiotherapy

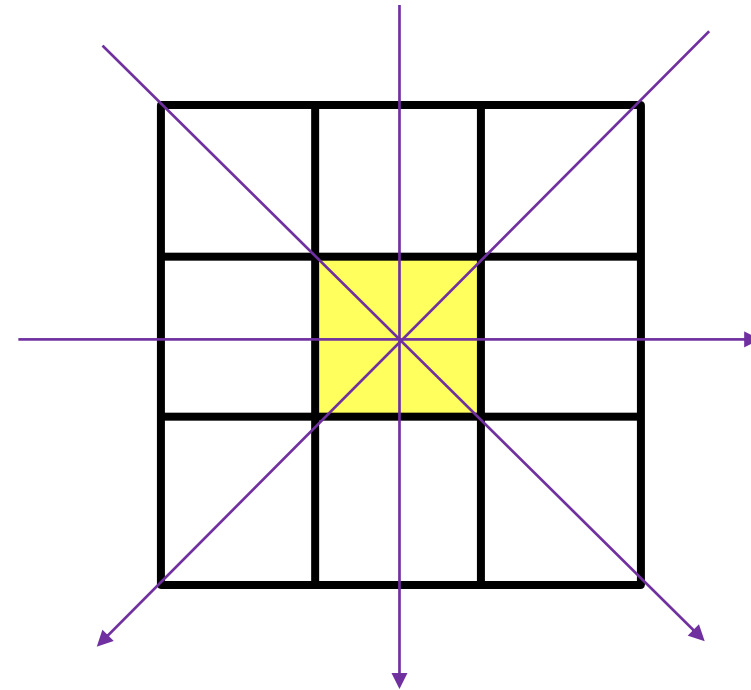
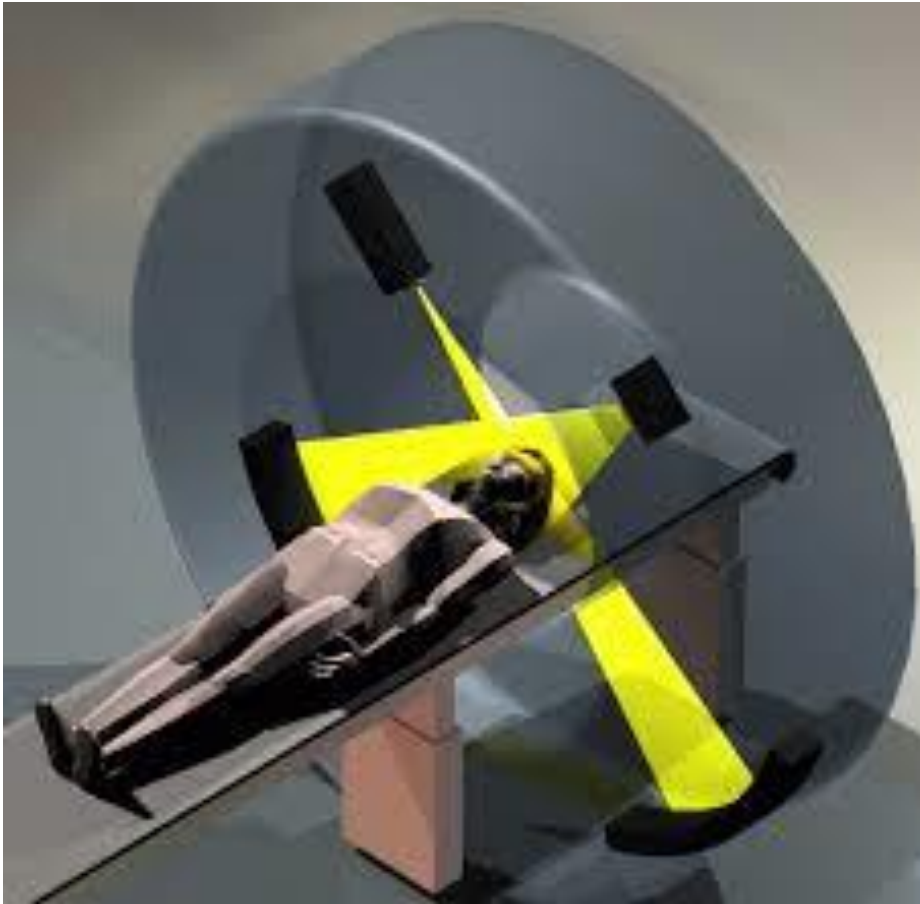
Modern radiotherapy mostly performed by linear accelerators (LINAC, 直線加速器)



BSc Applied Physics 理學士(應用物理學)

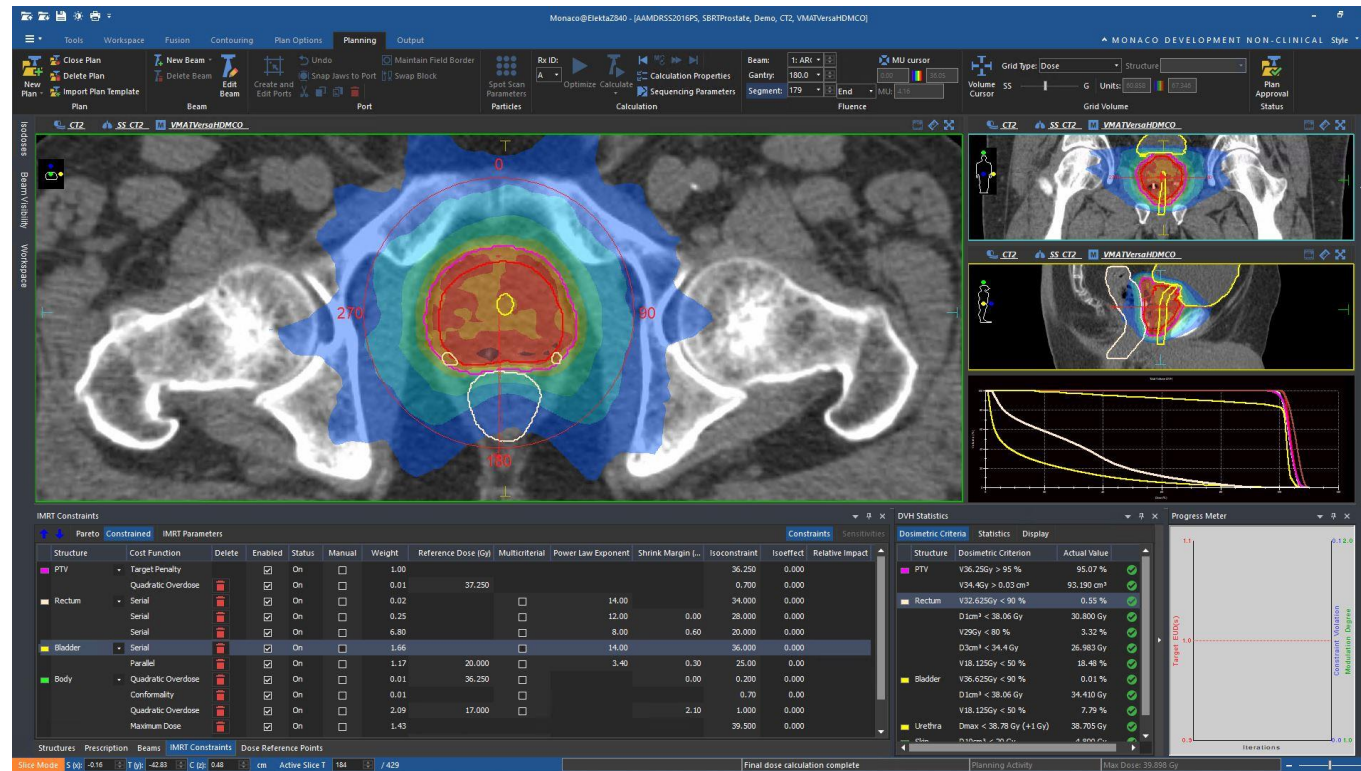
Radiotherapy

Multiple beams focus radiation on tumor



Radiotherapy

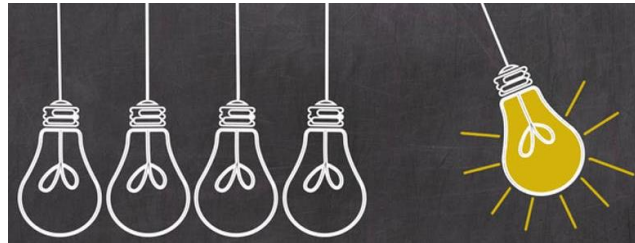
Careful planning is required, often aided by computer simulations and phantoms



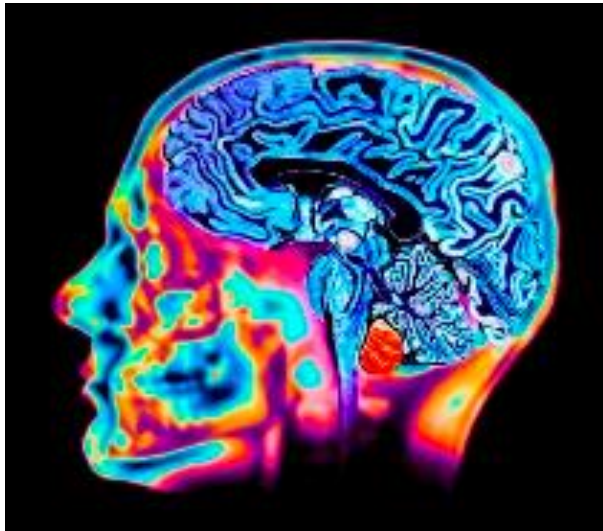
elekta.com

BSc Applied Physics @ CityU

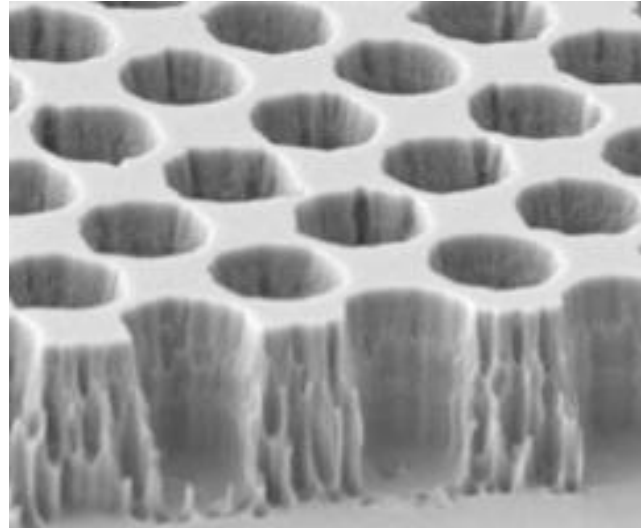
Curriculum



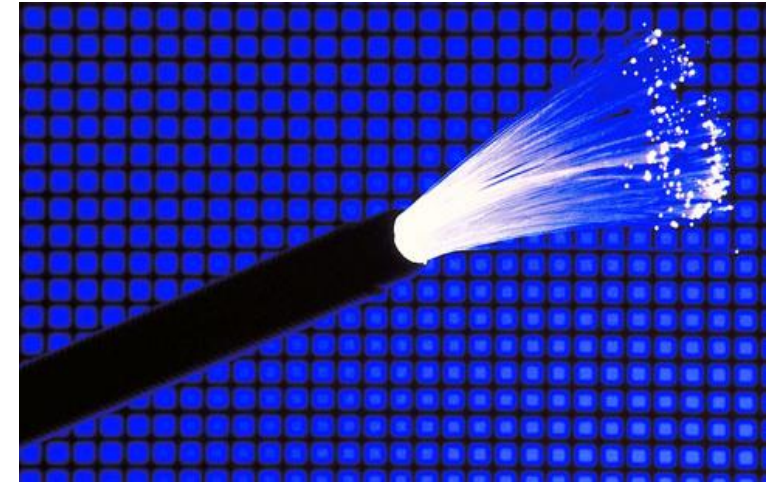
Fundamental physics



Medical physics



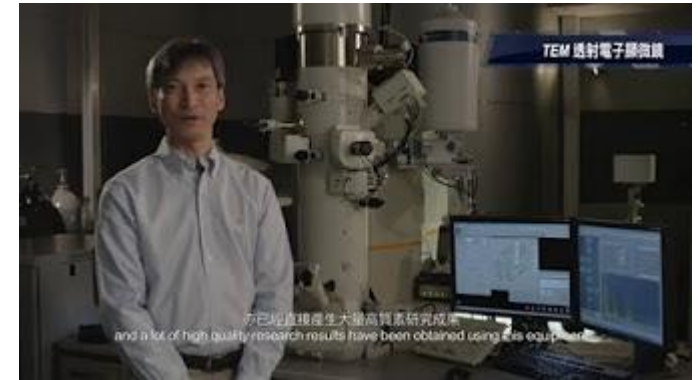
Materials physics



Photonics

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For further information on studying Physics, please view our promotional videos.



Youtube: “city university of hong kong” + “physics”.

Thank you!

