

”SCIENCE IS WONDERFUL AND A NECESSITY”

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Objectives of ISMWS:

- Encourages Muslim women to science professions and retain them in STEM**

”Islam encourages knowledge for both men and women”



University of Karachi, Pakistan
October 28, 2023



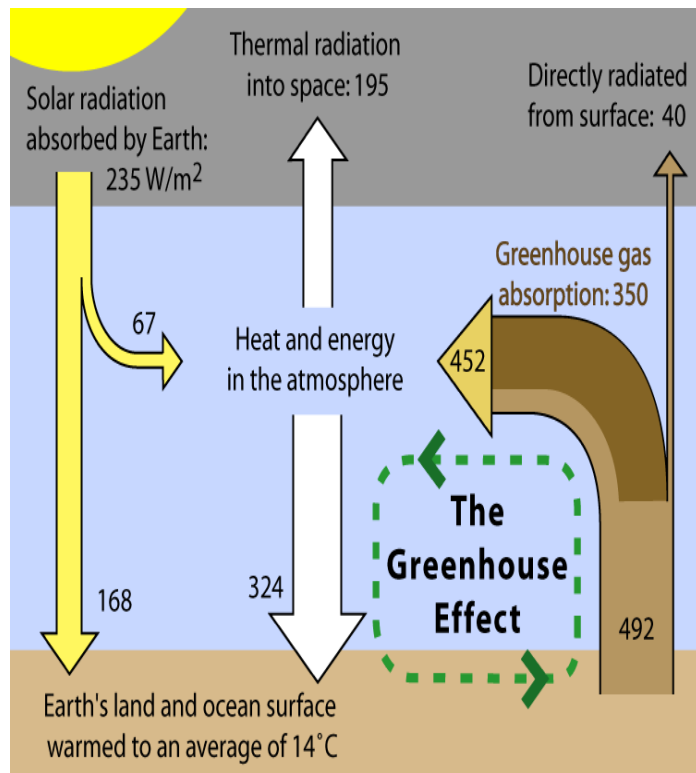
STEM: SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS

They are part of life, needed for advances for humanity, for survivability

- The knowledge gives us power to solve problems we face - such as COVID-19 pandemic, climate, space explorations, health, agriculture, - and gives us control to shape our future for the best. **We have many problems to solve**
- Why females are important? **They are half of the population - half of the intellectual power to make advances**
- Women and girls are under-represented in the field of sciences. Among the races. - Fraction of Muslim women in science is the lowest. But their total number is larger than it is assumed.

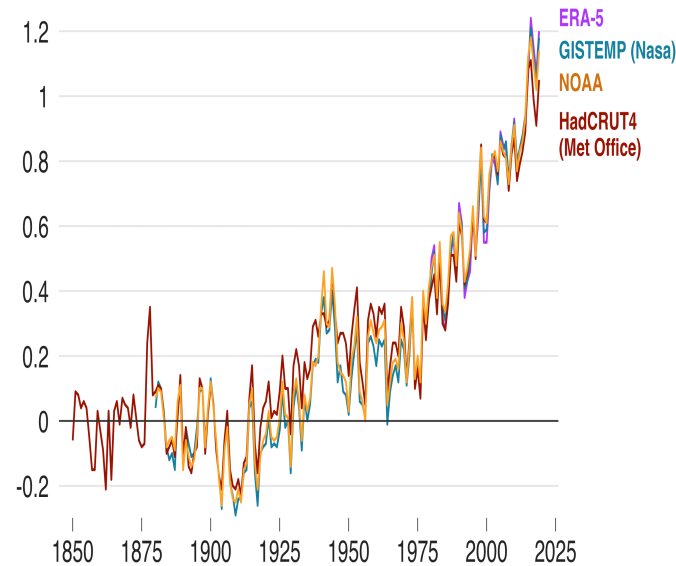


GLOBAL WARMING IMPACT: CLIMATE CHANGE ON RAIN, SNOW, ICE, DROUGHT, FLOODS, WATER



Temperature rise since 1850

Global mean temperature change from pre-industrial levels, $^\circ\text{C}$

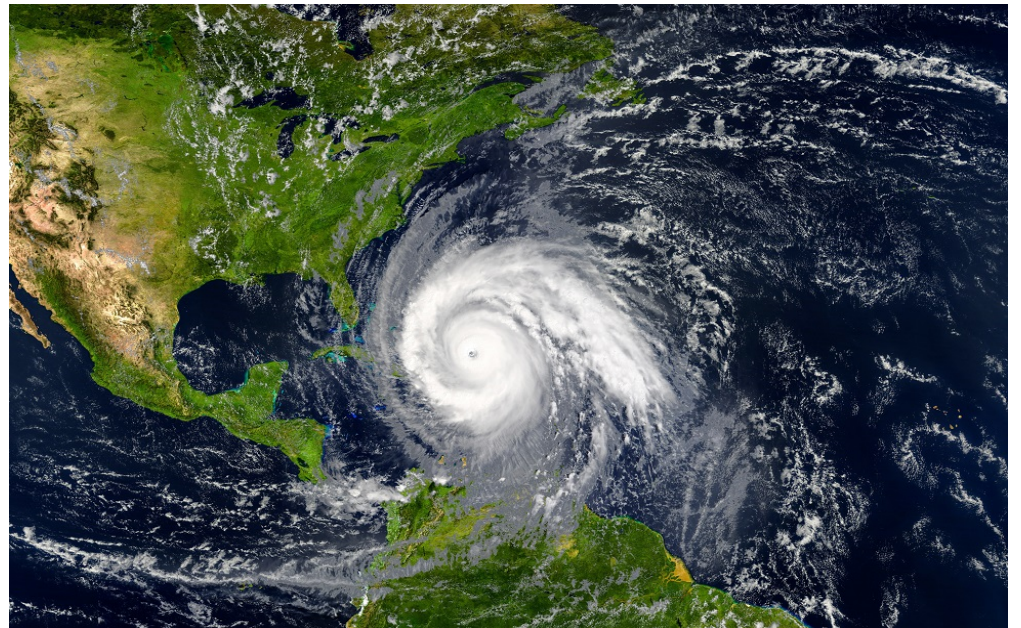


Source: Met Office



- Earth's temperature has risen by about 1.2°C from pre-industrial age temperature of 14°C .
- The temperature variation is not uniform - causing unusual rain, snow, droughts, tornadoes, tidal waves, wild fires
- COP conferences for climate change aims to stop at increase of 1.5°C .
- Ice sheets are melting. Sea level has risen by 8-9 inches - losing lands
- All types of research are needed, including atomic/molecular physics how the solar radiation is being absorbed. Models use numbers of higher uncertainty.

IMPACT OF UNUSUAL CLIMATE CHANGE - WILD FIRE IN CANADA, DROUGHT IN CHINA, MONSOON FLOOD IN PAKISTAN, HURRICANE IN THE USA

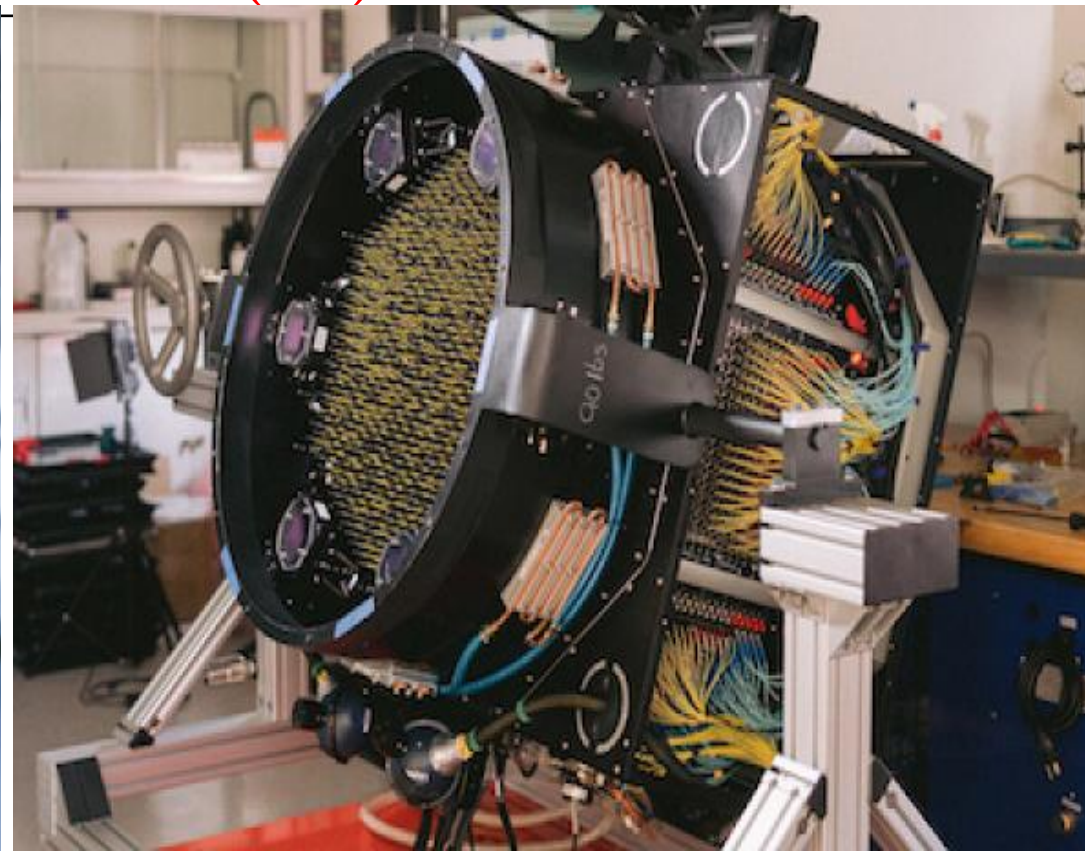
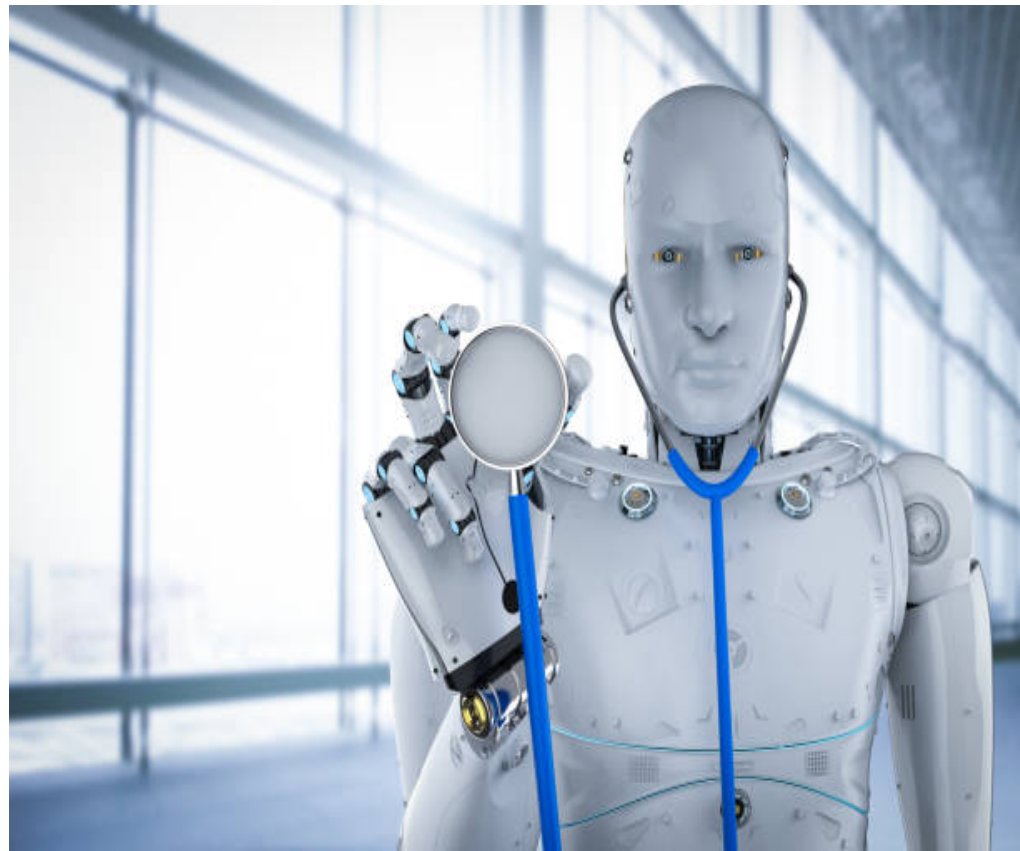


COVID-19 PANDEMIC: VACCINE INVENTORS



- Dr.. Ugur Shahin (Turkish Muslim German), Dr. Ozlem Torci (Turkish Christian German) - inventor of COVID-19 vaccine
- Messenger RNA (mRNA) revolution. Fortunate to have the research done by the two inventors. mRNA has many more potentials
- Close to 7.0 million people from 200 countries died from COVID-19. COVID-19 variants are evolving.
- Need research in all STEM fronts.

ARTIFICIAL INTELLIGENCE (AI) REVOLUTION



- AI sorted out data for symptoms to suggest few medical remedies
- Japan is ahead using robots for all sectors - including friends of elderly people
- OSU Astronomy has build robotic operated 500 cable telescope to observe 500 objects for the sky survey
- AI products ChatGPT, ChatBot - can write papers for you. They collect all available information and make decision without distraction
- However, ethic and human logic have been issues for AI
- Need harnessing the power and capabilities

ASTEROID BU 2023 PASSED BY THE EARTH, METEOR LAKE KARAKUL CREATED BY AN ASTEROID HIT



- BU was close but did not fall on the earths. Many do.
- NASA has satellite Scout to detect objects coming toward the earth. But detection is not early enough
- NASA also has DART satellite to test deflect an incoming asteroid

OUR IDEAS FOR SURVIVAL: LASER TRACTOR BEAM FOR DEFLECTION OF THE ASTEROID (STAR TREK)

- Requires much scientific advances for such a beam



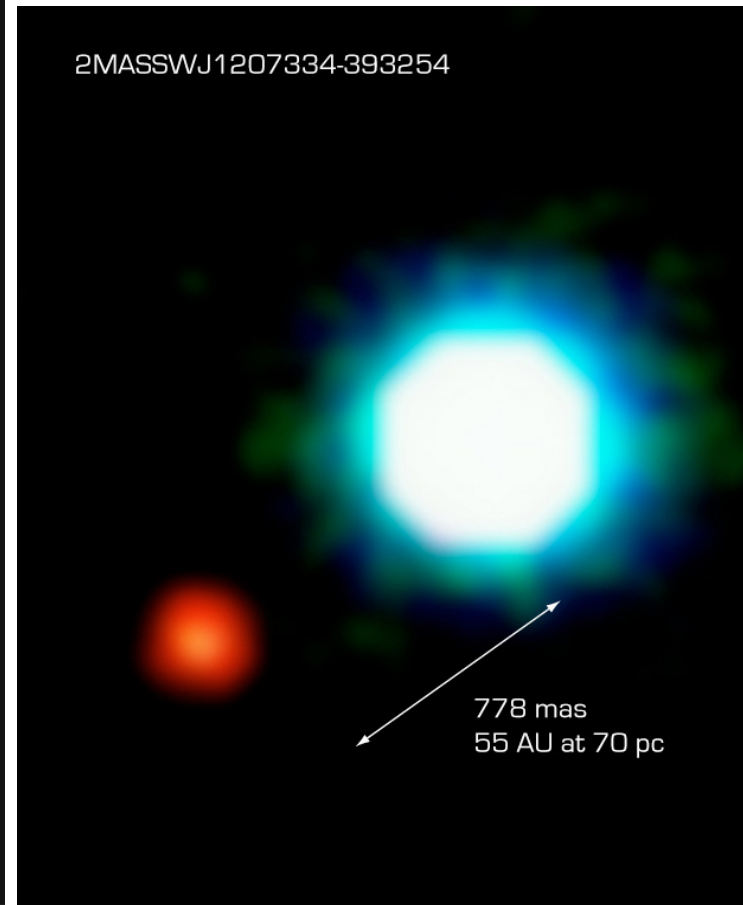
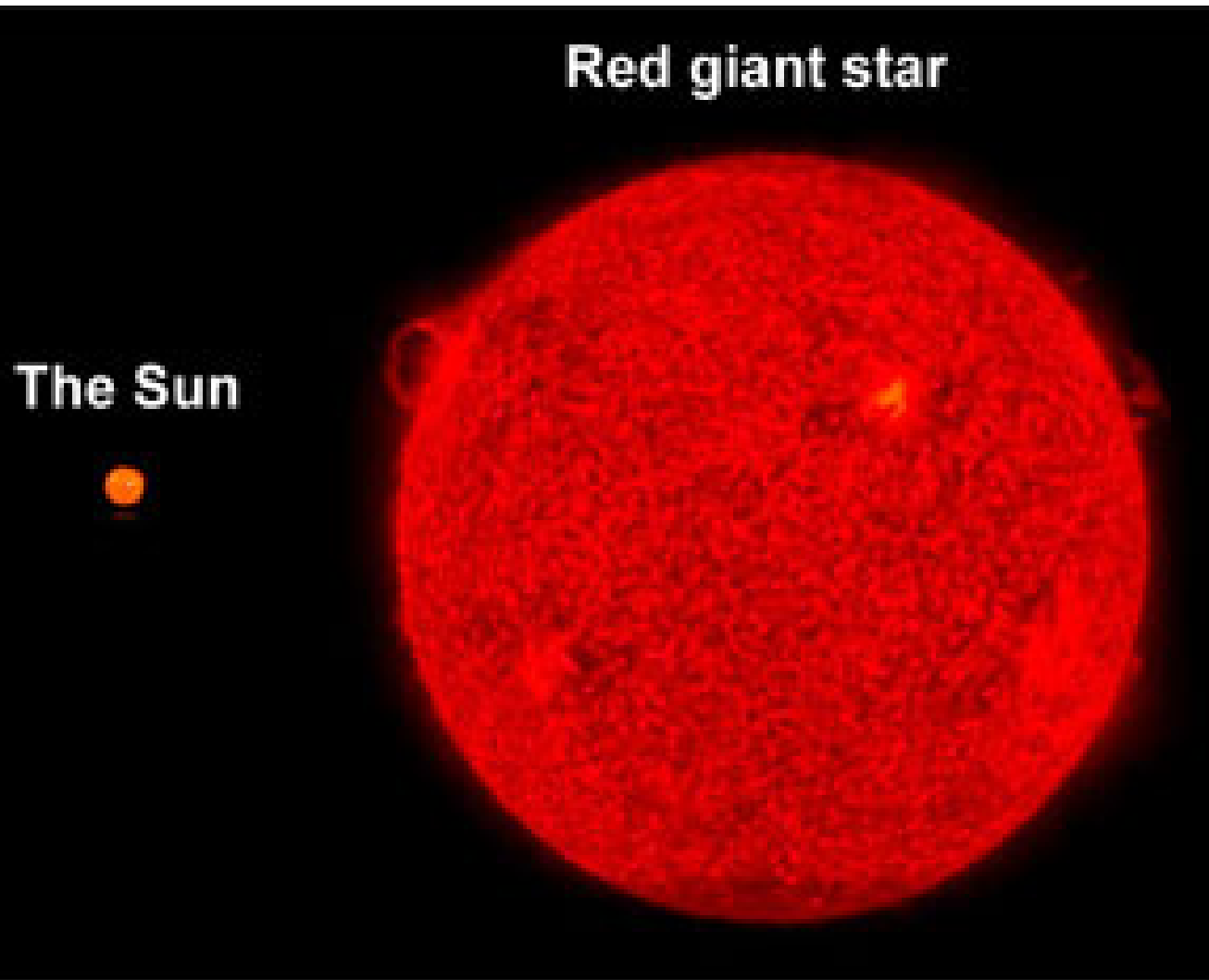
EARTHQUAKE AT MARRAKESH, MOROCCO, Sep 2023



- We do not detect the earthquake signal early enough have to move everyone to safety.
- We may need satellite for continuous monitor of any tectonic plate movement and more sensitive detectors on the earth.

LIFETIME OF OUR SUN: SEARCHING FOR A HOME

- Sun's fate after 6-7 billion years - Red Giant which will engulf all planets. **We need to survive.**
- Searching habitable exoplanets - expect to have 11 Billion planets in our galaxy - Milky Way. ~ 5000 detected.
- With current technology a spacecraft will take 18 thousands years to reach the nearest star Proxima a



STEM: Different from other disciplines



- STEM needs thinking, concentration and perseverance
- Each of us need to nurture and utilize our intellectual power. We need support & time to detach. Detachment is a necessity for any thoughtful work.
- Photo: My son and me in a hotel room during my attending a conference.

STEM: CHALLENGE YOUR POWER



- General assumption: Science is difficult
 - Remember: Nothing worth comes easy
 - Book says: Make effort - one credit, Success - two credits
 - Face the challenge - hit the boundary of your talent and power
- Pic: Sultana's presentation at UAE University for promotion of research and education in science

THE LONGEST RUNNING UNIVERSITY



- Universit Al Quaraouiyyine founded in 859 in Fez, Morocco is the oldest existing, continually operating and the first degree-awarding educational institution in the world (UNESCO and Guinness World Records[5][6])
- It was founded by a Muslim female, Fatima al-Fihri

THE 1ST OBSERVATORY, SAMARKAND, 1420, BY MUSLIM RULER ULUGH BEG (Iran has an older model)



- Ulugh Beg built the madrasa in 1420 in Samarkand and extended it to an observatory
- Beg himself recorded many astronomical objects.

SCIENCE IS BEAUTIFUL: X-RAYS FROM A BLACK HOLE - CENTAURUS A GALAXY

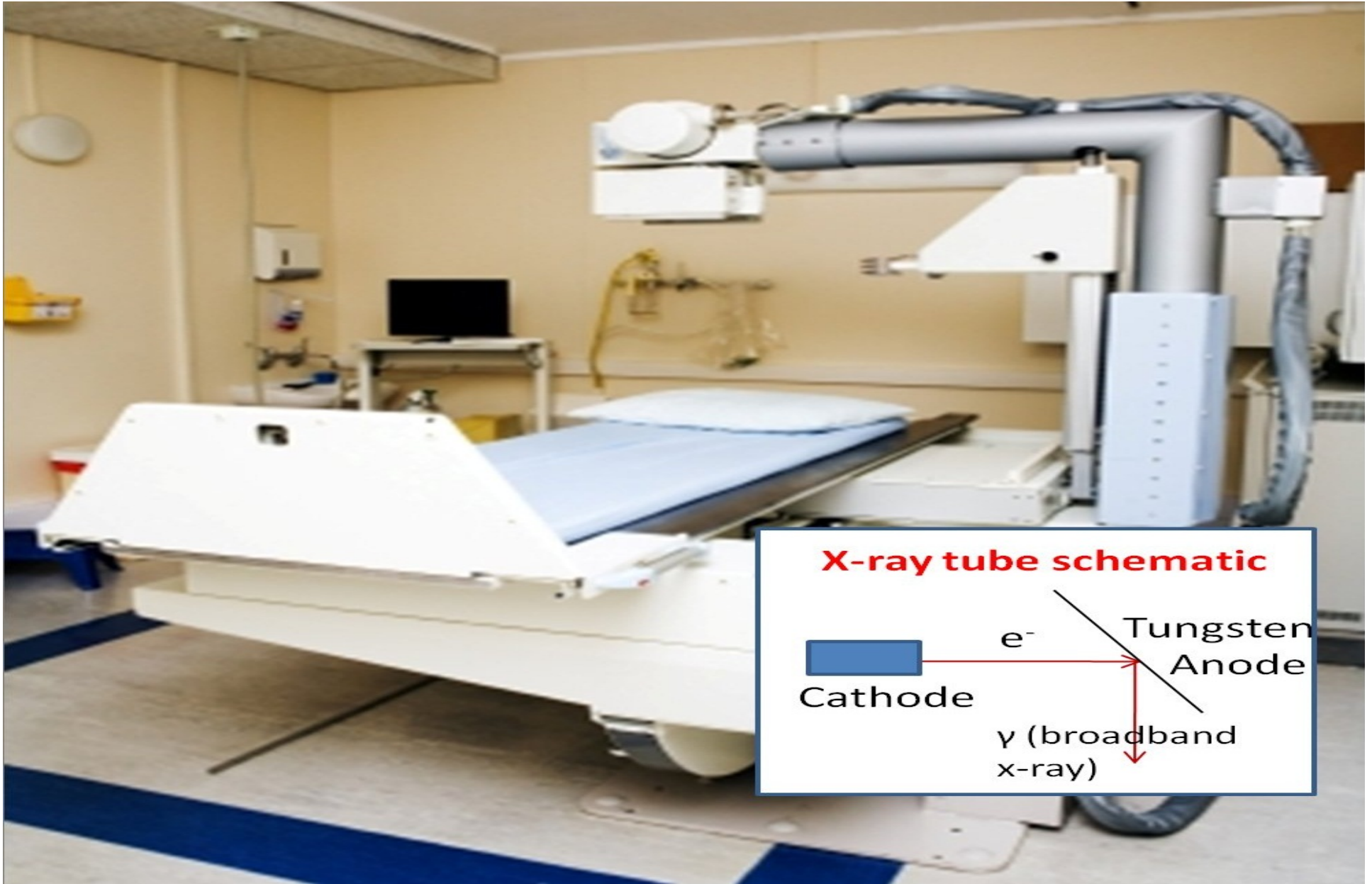


- Photometric image: red - low, green - intermediate, blue - high energy X-rays. Dark green & blue bands - dust lanes that absorb X-rays
- Blasting from the black hole a jet of a billion solar-masses extending to 13,000 light years

X-RAYS IN MEDICAL FACILITIES

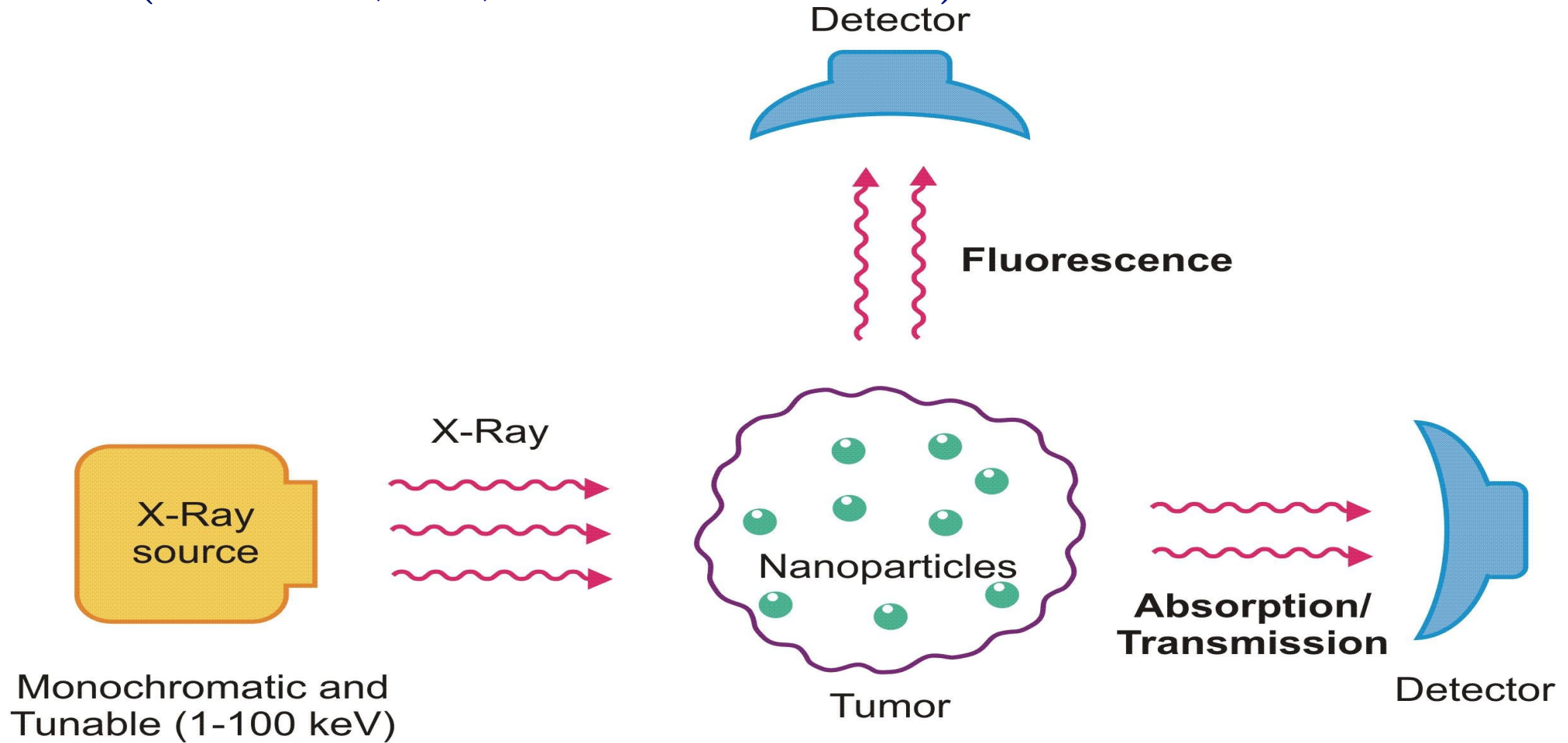
- Medicine: radiography, CT scans, imaging, Linear Accelerators (LINAC) for radiation therapy

Study of X-rays has led to new treatment



RESONANT NANO-PLASMA THERANOSTICS (RNPT)

(Pradhan, Yu, Nahar et al 2007)



- Find narrow resonant energy regions to initiate enhanced Auger processes for large number of photons and electrons
- Replace broadband and high energy X-ray irradiation by narrow-band monochromatic irradiation
- Create a monochromatic X-ray source tunable to target resonant energy band

PHYSICS INVENTIONS

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Astronomers reach for the stars to discover new cancer therapy

Cancer Discovery

cancerdiscovery.aacrjournals.org

doi: 10.1158/2159-8290.CD-NB080111-13

Cancer Discovery August 2011 1; 192

Astronomy Research Suggests Tumor Tools

py for Cancer

<http://www.astrobio.net/pressrelease/4>

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Astrotherapy for Cancer

Source: [Ohio State](#) press release

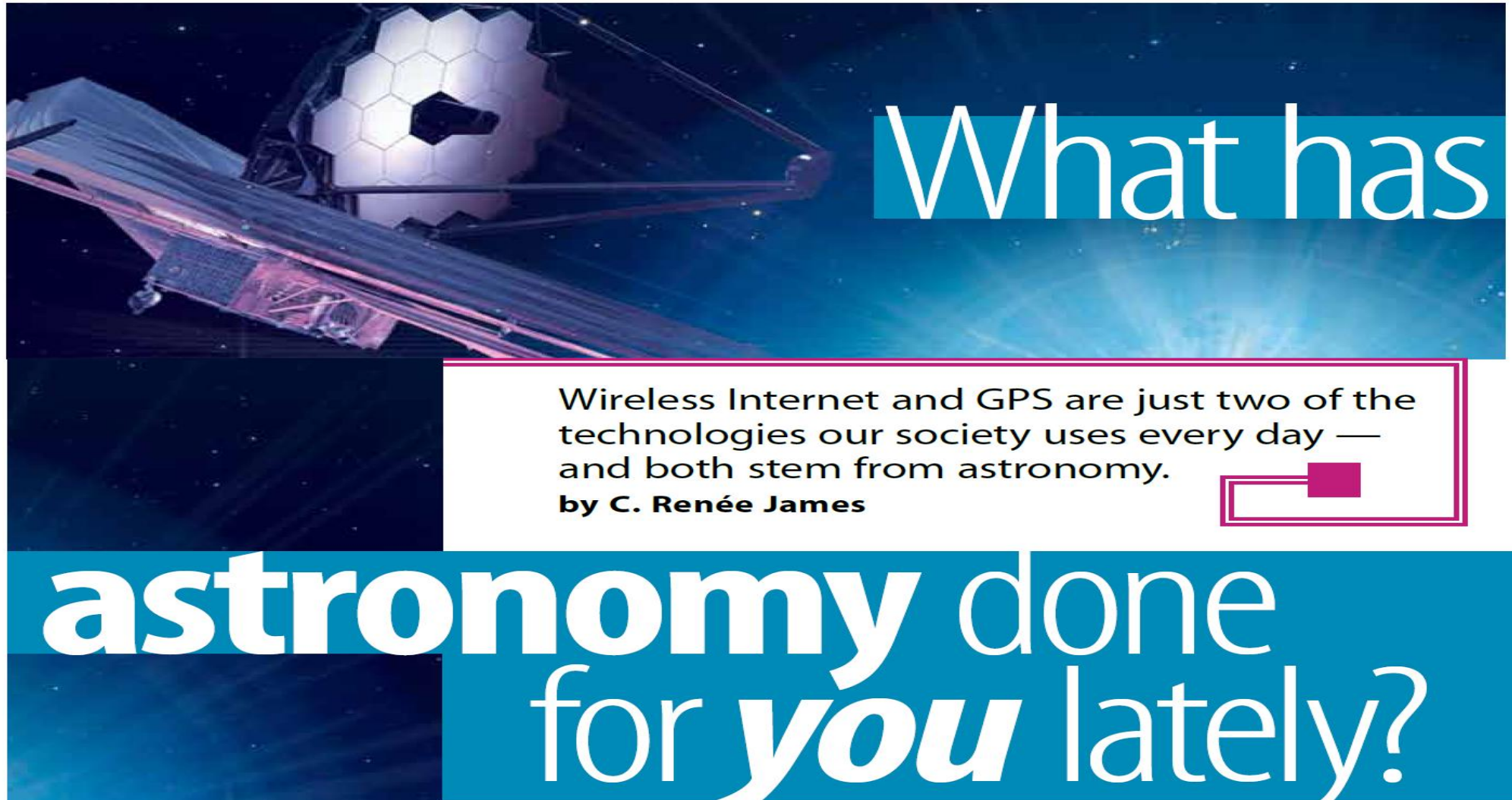
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Missions

Posted: 06/26/11

Summary: Astronomers have helped in developing a new radiation treatment that could aid cancer patients.



- Global Positioning System (GPS) for navigation
- Wireless Internet for networking
- Treating cancer with astronomy research
- Optics and the JWST technologies for laser eye surgery