



## Spectrum-Roentgen-Gamma Telescope

A joint team of **German-Russian scientists** will be launching a **Spectrum-Roentgen-Gamma (SRG)** space telescope. It will create a **three-dimensional (3D) X-ray** map of the universe and unveil unknown supermassive black holes, dark energy and stars.

- The SRG telescope aims to detect up to 3 mn supermassive black holes from the Milky Way.
- The telescope will be launched into space on a **Russian-built Proton-M rocket** from **Baikonur Cosmodrome in Kazakhstan**.
- The four-year mission will survey the entire sky eight times and track the evolution of the universe and dark energy.
- This is the first telescope which is sensitive to high energy hard X-rays.
- The mission will have **two independent** telescopes:
  - A German-built eROSITA (Extended Roentgen Survey with an Imaging Telescope Array).
  - A Russian-built ART-XC (Astronomical Roentgen Telescope X-ray Concentrator)
- Each of them covers X-ray bands stretching to relatively much higher energies: 0.2–10 kilo-electron volts (keV) for eROSITA, and 5–30 keV for ART-XC.

### X-Rays

- X-rays are a form of high-energy electromagnetic radiation. X-radiation is referred to as Röntgen radiation, after the German scientist **Wilhelm Rontgen** who discovered these in 1895.

### Soft and Hard X-rays

- X-rays are usually described by their maximum energy, which is determined by the voltage between the electrodes.
- X-rays with high photon energies (above 5–10 keV) are called **hard X-rays**.
  - Due to their penetrating ability, hard X-rays are widely used to image the inside of visually opaque objects.
- Those with lower energy (and longer wavelength) are called **soft X-rays**.

### Previous Missions

- Germany's ROSAT mission in the 1990s was sensitive only to 'soft' X-rays, with energies of about 2 keV.
- NASA's **Chandra X-ray Observatory** and **NuSTAR**, can see high-energy radiation and resolve tiny details of cosmic structures. But, they see only small parts of the sky.
- SRG was first proposed in 1987, by Russian astrophysicists, but the fall of the Soviet Union in 1991 led to the cancellation of the plan. It was again revived in 2004, but a proposal to send an X-ray telescope to the International Space Station was scrapped when NASA ended its space-shuttle programme in 2011.
- The joint mission was approved by the German space agency and Roscosmos later in 2009.

