

# New catalogue of 12,000 X-ray spectral lines

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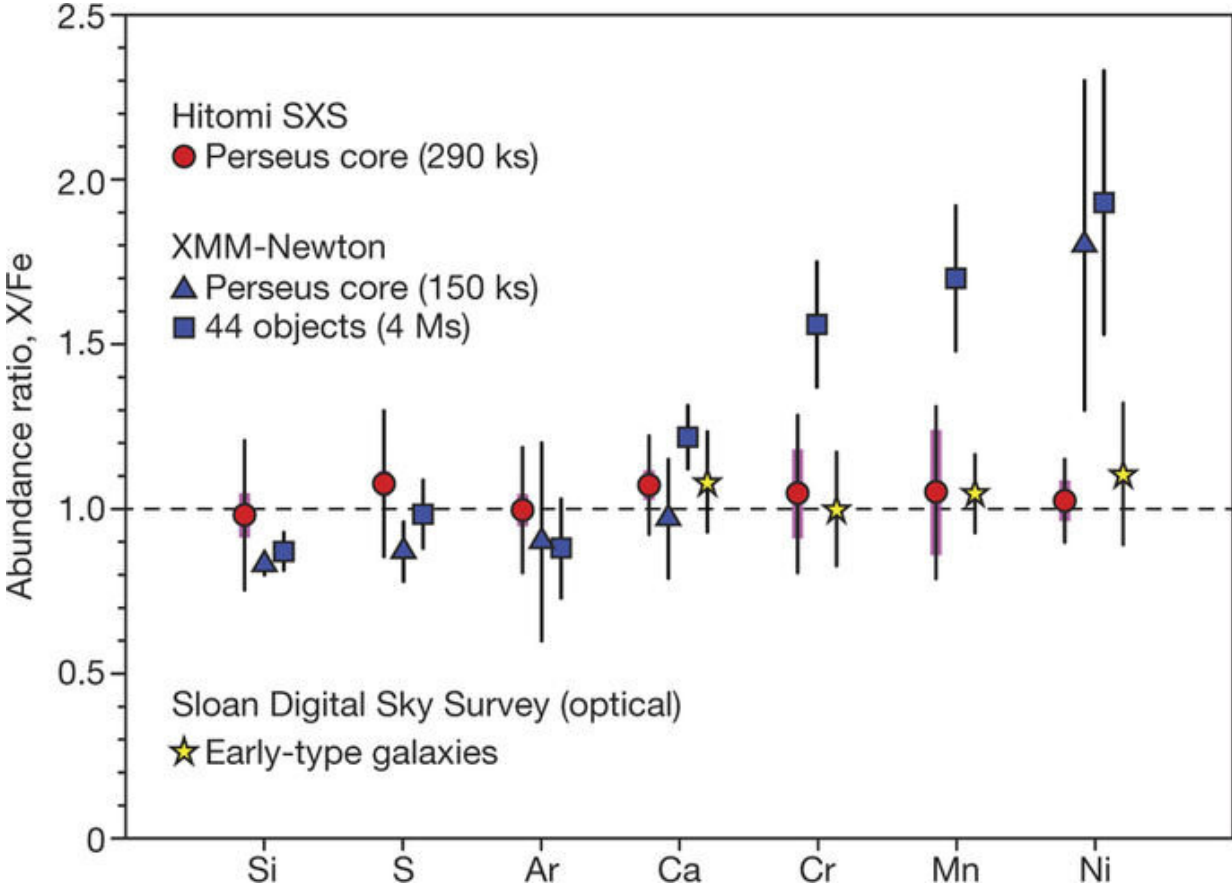
Credit: SRON Netherlands Institute for Space Research

X-ray sources in the sky radiate "bar codes" revealing their properties. These bar codes consist of narrow peaks and troughs within the source's spectrum. The RGS instrument on the satellite XMM-Newton was built

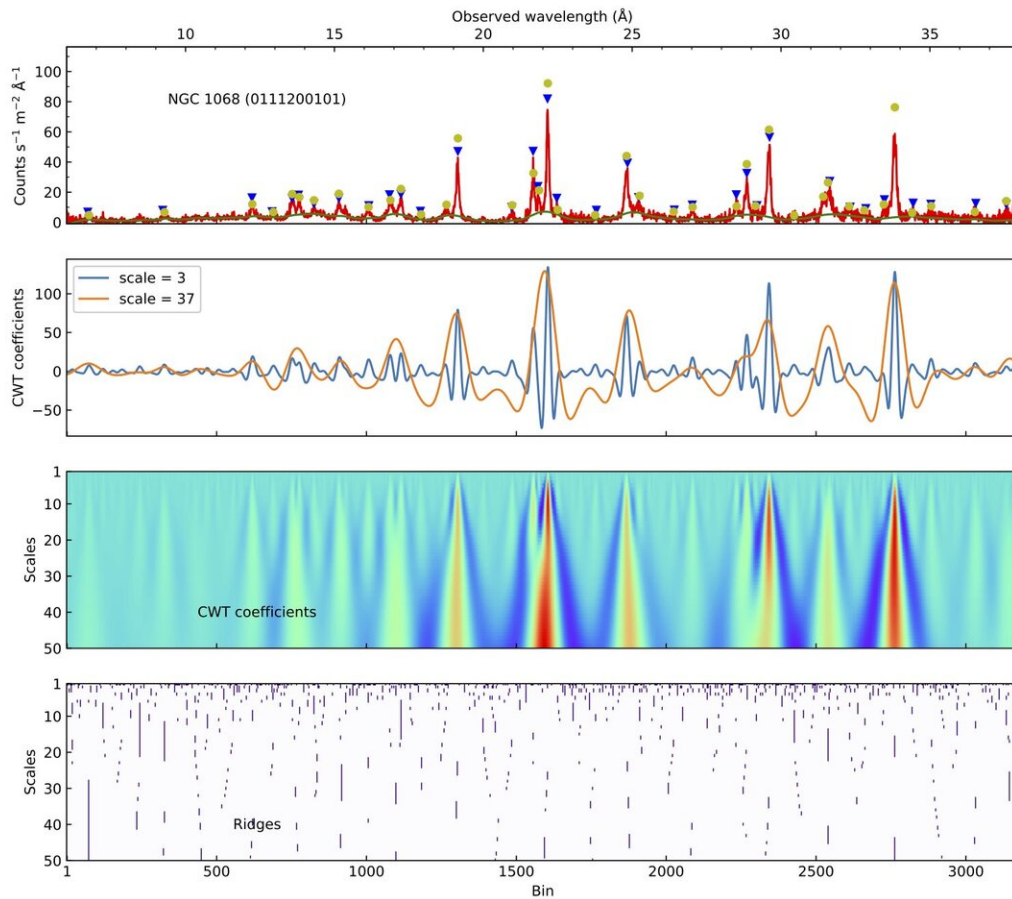
to find these bars—or spectral lines. Astronomer Junjie Mao and his colleagues at SRON and ESA have now created a catalogue filled with 12,000 X-ray lines, which astronomers can use to conduct large-scale surveys among the stellar population. They have reported its development in *Astronomy & Astrophysics*.

ESA's XMM-Newton satellite has been operational for almost 20 years, and is still producing continuous measurements of all possible X-ray sources. Scientific articles with new results appear on a daily basis. The RGS instrument, built under SRON supervision, registers spectra of the most luminous sources. These spectra, with a resolution of about one-6000th of a nanometer, can be quite complex, and the analysis is time-consuming. Nevertheless, astronomers need a catalogue of [spectral lines](#) to explain certain phenomena in the universe. For instance, astronomers want to know if there is a [causal relationship](#) between X-ray lines and UV-lines within the spectrum of the same object. Or to estimate how many stars have a significant amount of nitrogen, for example.

Astronomer Junjie Mao and his colleagues at SRON and ESA have now created such a catalogue. Mao developed an algorithm that automatically searches for lines within a random X-ray spectrum. He applied the algorithm to the RGS-instrument's top 2,400 observations and found 12,000 different lines. Mao recently obtained his PhD at SRON and Leiden University and now works at the University of Strathclyde in the United Kingdom.



Credit: SRON Netherlands Institute for Space Research



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**More information:** Junjie Mao et al. CIELO-RGS: a catalogue of soft X-ray ionized emission lines, *Astronomy & Astrophysics*, 2019. arXiv:1904.05446v1 [astro-ph.HE]. [arxiv.org/abs/1904.05446](https://arxiv.org/abs/1904.05446)

Provided by SRON Netherlands Institute for Space Research

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