

## News &amp; Comments

## An Anomaly in the Experiment Confirms the Existence of New Elementary Particles

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Using the Baksan Experiment on Sterile Transitions (BEST), researchers are trying to find connections between the gallium anomaly and the oscillations between active and sterile neutrinos. In previous BEST experiments, an anomaly was observed. As a result, one could have discovered a brand-new elementary particle, the sterile neutrino, or be on our way to understanding a new aspect of standard model physics, such as neutrino cross-section.

BEST irradiated an inner and outer tank of gallium, a soft, silvery metal also used in previous experiments, though previously in a one-tank setup, with 26 irradiated disks of chromium 51, a synthetic radioisotope of chromium. Chromium 51 and gallium produce electron neutrinos that result in germanium 71. Germanium 71 production rates were 20–24% lower than predicted based on theoretical modelling. It is similar to an anomaly that occurred previously. This and other investigations revealed a lack of electron neutrinos, a difference between expected and observed results known as the "gallium anomaly."

Since, in the BEST experiment, the same anomaly occurred. The possible explanations again include oscillation into a sterile neutrino. Dark matter may be made up of this hypothetical particle. The anomaly could also be the result of a misinterpretation of the theoretical inputs to the experiment or a problem with the physics itself.

Researchers reviewed the methodology of the experiment to make sure that there were no mistakes, such as the placement of the radiation source or the operation of the counting system. It is possible that future iterations of the study could include a radiation source with greater energy, a longer half-life, and better sensitivity to shorter oscillation wavelengths.

This would be evidence of the sterile neutrino, a material present in gigantic quantities but making only a dimple in space's fabric by its gravitational pull. Further research on the ghostliest of ghost particles will determine whether that is dark matter in its entirety or merely a piece of it.

### KEYWORDS

Baksan Experiment on Sterile Transitions (BEST), germanium 71, gallium anomaly, sterile neutrino, Dark matter

