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Experimental detection of the CNO cycle

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Stars are fueled by nuclear reactions occurring in their core. In massive stars (approximately 1.3 more massive than our Sun) the dominant reactions are believed to be those belonging to the so-called CNO cycle, while in lighter stars (including our Sun) the proton-proton chain prevails. Until now, we had no direct experimental evidence of the existence of the CNO cycle.
Recently, the Borexino collaboration has announced the first observation of neutrinos emitted by the CNO reactions in the Sun's core, experimentally proving that this mechanism envisaged by Bethe and Weizsacker in the 30's indeed exists.
In this talk, I will describe some details of this challenging quest, which has started approximately 5 years ago, when we realized that Borexino, which had already performed a complete spectroscopy of neutrinos from the proton-proton chain in the Sun, had the sensitivity to also tackle CNO neutrinos.
The capability to observe CNO neutrinos is strictly connected to the possibility to disentangle their signal in the detector from the noise produced by several backgrounds, in particular, the radioactive decay of the isotope 210Bi.
The story of how we were able to measure the faint CNO signal coming from our Star by keeping as stable as possible the temperature of our detector is an interesting one and I will try to tell it underlying the main issues and complications we had to overcome.

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