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Testing the Pauli Exclusion Principle for Electrons

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One of the fundamental rules of nature and a pillar in the foundation of quantum theory and thus of modern physics is represented by the Pauli Exclusion Principle.

We know that this principle is extremely well fulfilled due to many observations. Numerous experiments were performed to search for tiny violation of this rule in various systems. The experiment VIP at the Gran Sasso underground laboratory is searching for possible small violations of the Pauli Exclusion Principle for electrons leading to forbidden X-ray transitions in copper atoms. VIP is aiming at a test of the Pauli Exclusion Principle for electrons with high accuracy, down to the level of 10^{-29} - 10^{-30} , thus improving the previous limit by 3-4 orders of magnitude. ☒

The experimental method, results obtained so far and new developments within VIP2 (follow-up experiment at Gran Sasso, in preparation) to further increase the precision by 2 orders of magnitude will be presented.

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