Calculations of the hyperfine constants of ^{35}Cl $3p^4 4s\ ^4P$ and $3p^4 4p\ ^4D$

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This work follows previous work on ab-initio calculations of hyperfine constants of some atomic states of nitrogen [1,2], fluorine [3,4] and oxygen [4]. For all these elements and also chlorine, hyperfine spectra was measured using saturation absorption spectroscopy [5-8]. In general a good agreement between theoretical and experimental values of the hyperfine constants were obtained. All calculations mentionned in [1-4] were performed using ATSP-2K [9] and GRASP-2K [10] codes.
For the first time the hyperfine structures of ^{35}Cl $3p^4 4s\ ^4P_{1/2,3/2,5/2}$ and $3p^4 4p\ ^4D_{1/2,3/2,5/2,7/2}$ are investigated theoretically. We use Multiconfiguration HartreeFock (MCHF) method, included in ATSP-2k code, comparing different correlation models. The influence of the relativistic effects on the hyperfine structures is investigated by using the Breit-Pauli approximation, also included in the ATSP-2k code.
The preliminary results show that the valence-valence correlation is the dominant effect, while the influence of relativistic effects on the hyperfine constants is negligible. These conclusions are made by comparing our theoretical results with experimental values [8] and between which there is a satisfactory agreement.

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