Supervisor reference on the bachelor thesis of Anna Volchkova

The bachelor thesis of Anna Volchkova is devoted to theoretical investigation of the Zeeman splitting in highly charged ions within the dual-kinetic-balance approach for solving the Dirac equation in axially-symmetric field (the A-DKB method). The formulae for the matrix elements of various one-electron and two-electron operators with the wave functions obtained by this method are derived in this work. Numerical computations for the hyperfine-interaction operator provided the corresponding correction to the g-factor of hydrogen-like ions with nonzero nuclear spin for the $1s$, $2s$, $2p_{1/2}$ and $2p_{3/2}$ states. Comparison between the high-precision experimental and theoretical data can lead to the determination of the nuclear magnetic moments with the unprecedented accuracy. The results for the $2p_{1/2}$ and $2p_{3/2}$ states, first obtained in this work, open the possibility for such investigations in boron-like ions.

Anna Volchkova works in my group for one and a half years. She is motivated and responsible student showing first-class skills in solving both numerical and analythical problems. She participates in the project "Zeeman splitting in highly-charged ions: novel approach to the non-linear effects" supervised by myself and supported by the FAIR-Russia Research Centre. In September she will give a poster presentation at the 18th International Conference on Physics of Highly Charged Ions. In my opinion, this bachelor thesis deserves the highest mark. I strongly recommend Anna Volchkova to continue study for MSc degree.

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DGlazov

Dr. Dmitry A. Glazov

associate professor