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Higher order variational origin of the Dixon's system and its relation to the quasi-classical 'Zitterbewegung' in general relativity. (English summary)

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Summary: "We show how the Dixon's system of first order equations of motion for the particle with inner dipole structure together with the side Mathisson constraint follows from rather general construction of the 'Hamilton system' developed by Weysenhoff, Rund and Grässer to describe the phase space counterpart of the evolution under the ordinary Euler-Poisson differential equation of the parameter-invariant variational problem with second derivatives. One concrete expression of the 'Hamilton function' leads to the General Relativistic form of the fourth order equation of motion known to describe the quasi-classical 'quiver' particle in Special Relativity. The corresponding Lagrange function including velocity and acceleration coincides in the flat space of Special Relativity with the one considered by Bopp in an attempt to give an approximate variational formulation of the motion of self-radiating electron, when expressed in terms of geometric quantities."

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Note: This list reflects references listed in the original paper as accurately as possible with no attempt to correct errors.

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