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Nanocomposites for waste water remediation

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Nanocomposites represents the new trend of research for scientists and industrial innovation. The product, processes and applications are expected to contribute significantly to water and wastewater treatment. However, using nanocomposites in different products may release emerging and nanocomposites contaminants in the environment as well. Research into the environmental effects of nanotechnologies, emerging and nanocomposites has been more important nowadays. Carbon-based materials, either natural or engineered, such as carbon nanotubes, nanodiamonds and nanowires are used in biomedical applications, super-capacitors, sensors, and photovoltaics. The pollution of water sources by wastewater renders water unsafe to drink even in those places where water is plenty. Therefore, the knowledge of the treatment techniques in wastewater is highly essential. Focus of my talk will be the overview of the status of the nanocomposites in removal of such contaminats from wastewater.

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Mathisson-Papapetrou-Tulczyjew-Dixon equations in ultra-relativistic regime and gravimagnetic moment

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Mathisson-Papapetrou-Tulczyjew-Dixon (MPTD) equations are widely assumed during the seventy years as the basic tool for description of a rotating body in general relativity. We propose the Lagrangian formulation of MPTD equations and analyze them on this base. We show that MPTD equations correspond to the minimal interaction of spin with gravity. Due to the interaction, in the Lagrangian equations instead of the original metric, g emerges spin-dependent effective metric G=g+h(S). So we need to decide, which of them, the MPTD particle sees as the space-time metric. We show that MPTD equations, if considered with respect to original metric, have unsatisfactory behavior: The acceleration in the direction of velocity grows up to infinity in the ultra-relativistic limit. If considered with respect to G, the theory has no such problem. But the metric now depends on spin, so there is no unique space-time manifold for the Universe of spinning particles. Each particle probes its own three-dimensional geometry. This can be improved by adding a non-minimal interaction, and gives the modified MPTD equations with reasonable behavior within the original metric.

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