

Seminar: "Geometry&Physics@DFT"

Location: seminar room DFT (IFIN-HH),
(<http://events.theory.nipne.ro/gap/index.php/seminar>)

Date: Thursday, October 10, 2013, 11 am

Title: **Multisoliton Interactions for the Perturbed Manakov System**

Speaker: **Prof. Vladimir GERDJIKOV**

Abstract: We analyze the dynamical behavior of the N -soliton train in adiabatic approximation of the Manakov system (MS)

$$i\vec{u}_t + \frac{1}{2}\vec{u}_{xx} + (\vec{u}^\dagger, \vec{u})\vec{u} + V(x, t)\vec{u}(x, t) = 0, \quad (1)$$

perturbed by the external potential $V(x, t)$. We analyze the dynamics of N -soliton trains of Cauchy problem composed by MS, Eq. (1) and the initial condition

$$\vec{u}(x, t = 0) = \sum_{s=1}^N u_{s;1s}(x, t = 0)\vec{n}_s, \quad (2)$$

where $u_{s;1s}(x, t)$ is the 1-soliton solution of the scalar nonlinear Schrödinger equation with given initial velocity μ_k , amplitude ν_k , phase ϕ_k , position ξ_k and normalized polarization vector \vec{n}_s , for details see [1].

We show that the dynamics of the N -soliton train is modeled by a perturbed complex Toda chain for the train parameters which generalizes the results of [1]. In our studies we are combining analytical and numerical approaches and focus on the effects of the perturbation on the bound states of the N -soliton trains. The results obtained extend those in Refs. [1, 2] and elucidate the properties of the soliton interactions when the integrable MS is perturbed into a nonintegrable two-component Schrödinger equation.

References

- [1] V.S. Gerdjikov, E.V. Doktorov, and N. P. Matsuka. N -soliton Train and Generalized Complex Toda Chain for Manakov System, *Theor. Math. Phys.* **151**(3), 762–773 (2007).
- [2] M. D. Todorov and C. I. Christov. Impact of the Large Cross-modulation Parameter on the Collision Dynamics of Quasi-particles Governed by Vector NLSE, *Math. Comp. Simul.* **80**(1), 46–55 (2009).