



## International scientific online seminar on Analysis, Differential Equations and Mathematical Physics

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

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### Some results on the inverse spectral theory for the Sturm-Liouville operator on the line

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We discuss some results concerning the inverse spectral theory of the Sturm-Liouville operator

$$L := \frac{1}{y(x)} \left( -\frac{d}{dx} \left( p(x) \frac{d}{dx} \right) + q \right)$$

where the functions  $p(x), q(x), y(x)$  are continuous and bounded, and the weight function  $y(x)$  is strictly positive. In particular, we focus our attention on two main problems related to the inverse spectral theory for  $L$ :

- (1) the scattering theory on the whole line, by developing a Gel'fand-Levitan-Marchenko theory for  $L$ ;
- (2) the algebro-geometric theory, by obtaining trace formulas for  $L$ , and studying the properties of  $p(x), q(x)$  and  $y(x)$  in a suitable algebraic surface.

The Weyl  $m$ -functions  $m_{\pm}$  will play a crucial role, both in defining and in solving the inverse problems.

Applications to the study of solutions of some hierarchies of nonlinear evolution equations will be considered, including the well-known Korteweg-de Vries and Camassa-Holm ones.

\*Seminar website: <https://rmc.sfedu.ru/seminar>. The seminar uses Microsoft Teams online platform.

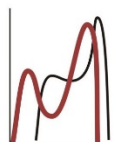
To join the seminar, please send a request to [pichugina@sfedu.ru](mailto:pichugina@sfedu.ru) (Olga Pichugina, scientific secretary).

The seminar is organized by the Regional Mathematical Center of the Southern Federal University in collaboration with Institute of Mathematics, Mechanics and Computer Sciences of the Southern Federal University and the special Interest ISAAC-OTHA group in Operator Theory and Harmonic Analysis.

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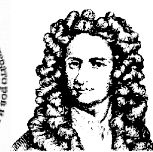
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