



The Abdus Salam

**International Centre  
for Theoretical Physics**



**Conference on Frontiers of Nanoscience  
24 August - 1 September 2015, Trieste, Italy**

## **IVC of Corbino Disc under Quantum Hall Effect Conditions**

<sup>1</sup>**V. Shikin,** <sup>2</sup>**I.Chikina**

<sup>1</sup>ISSP, RAS, Chernogolovka, Moscow District, Russia

<sup>2</sup>IRAMIS, LIONS, UMR NIMBE 3299 CEA-CNRS,  
CEA-Saclay, Gif-sur-Yvette, France

### Abstract:

We discuss the details of the observed IVC of the Corbino disc under Quantum Hall Effect (QHE) conditions in the area  $V \ll V_{break}$ , where  $V$  is the transport potential difference between the edges of the Corbino disc,  $V_{break}$  - the break down voltage of the QHE. It is shown that these details depend on the uniformity level of the  $2D$  electron density of studied objects. For systems with so-called regular nonuniformity of electron density distribution  $n(x)$ , when  $dn(x)/dx \neq 0$ , there are some special features in IVC behavior. First of all there are some finite magnetic field intervals in the  $I(H)$  dependence with  $dI/dH = 0$  ( $I$  being the total current,  $H$  - the magnetic field). Besides the initial part of the IVC is purely non ohmic :  $dI(V)/dV|_{V \rightarrow 0} \rightarrow 0$ ,  $d^2I(V)/dV^2|_{V \rightarrow 0} \rightarrow 0$ . The reasonable interpretation of these details in the Corbino IVC behavior is related to the properties of incompressible channels appearing on the  $n(x)$  profile under QHE conditions.