# Magnetotransport Studies of p-InSb(Mn) Crystals Under Hydrostatic Pressure in High Magnetic Field

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## Introduction

It was proposed in [1 ] that the *crystalline excitonium* model [2] could be the most appropriate to explain the unusual resistivity-temperature dependence and Colossal Magnetoresistance (CMR) revealed in our previous experiments on InSb crystals doped with manganese, where the ratio of the holes and electrons masses in InSb is about $m_h/m_e$ ~ 50 [3]. To proof this suggestion we measured the ρ-T dependence at T=300-0,04K and pressure P=0-17kbar in magnetic field up to 18T using NHMFL facilities -$He^3$ cryostat, $He^3$-$He^4$ Dilution Refrigerator, pressure cell and superconductive magnets.

## Results and Discussion

The ρ-T dependence at a series of pressures P=0; 1,5; 6; 12 and 17kbar is shown in Fig.1 for InSb(Mn) sample at manganese concentration $N_{Mn}=1,5\times10^{17}cm^{-3}$. The temperature $T_{cryst.}$ ( Fig.1), which we associate with the temperature of *crystalline excitonium* formation ( Wigner crystallization), increases under pressure from T=0.2K at P=0 to 1.2K at P=17kbar . External magnetic filed induces CMR effect as it is shown in Fig.2. CMR at $T<T_{cryst.}$ under pressure decreases and practically disappears at P=17kbar (Fig.2). We propose that external magnetic field destroys Wigner crystal at ambient pressure and induces insulator-metal transition, i.e. CMR effect. The excitonic binding energy increases under pressure that makes external magnetic field incapable to destroys Wigner crystal and therefore we can not see any CMR effect under pressure P>10kbar (Fig.2).

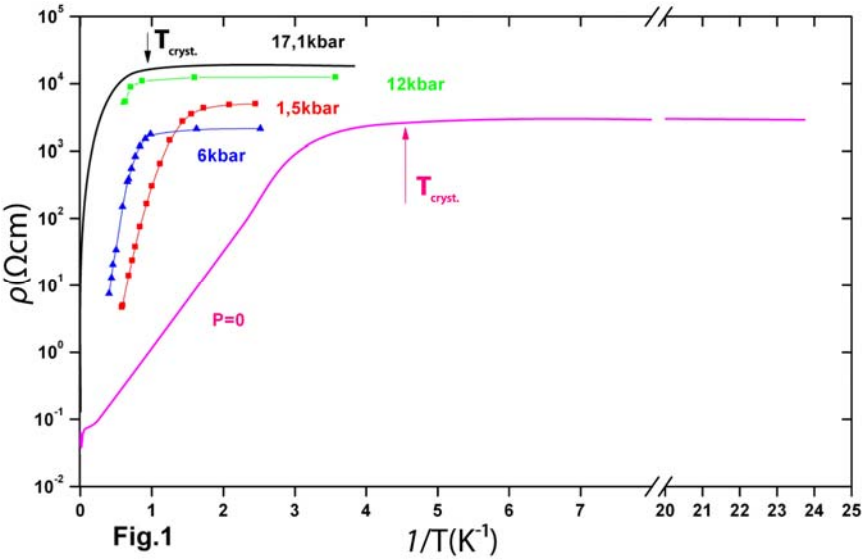


Fig.1

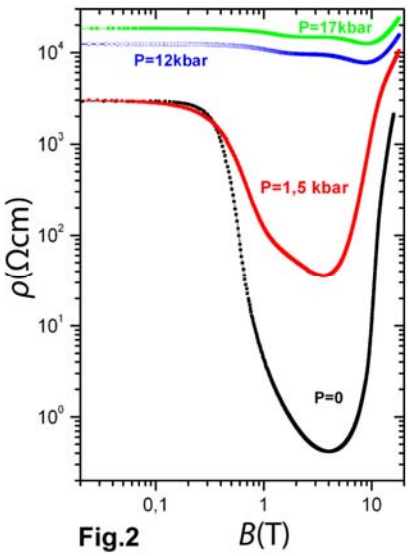


Fig.2

## Conclusions

The revealed low temperature resistivity saturation and CMR in InSb(Mn) crystal could be interpreted as the observation of the unique three dimensional (3D) Wigner crystal properties.

## Acknowledgements

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## References

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