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3.3.1: Research papers published by the teachers in the Journals notified on UGC care list during 2021.

1	Synthesis of copper containing polyaniline composites through interfacial polymerisation: An effective catalyst for Click reaction at room temperature	Dr. Mitali Chetia	Chemistry	Journal of molecular structure	2021	0022-2860	https://www.sciencedirect.com/journal/journal-of-molecular-structure	https://www.sciencedirect.com/science/article/abs/pii/S0022286021001502	Scopus
2	TeV scale resonant leptogenesis with $L\mu - L\tau$ gauge symmetry in light of the muon $g - 2$	Devabrat Mahanta	Physics	PHYSICAL REVIEW D	2021	2470-0010	https://journals.aps.org/prd/	https://journals.aps.org/prd/abstract/10.1103/PhysRevD.104.075006	Web of Science
3	Theoretical Study on various Contributions of the magnetization of $Pb_{1-x}MnxS$ and $Pb_{1-x}MnxSe$	Hitoram Roy	Physics	Journal of Low-Temperature Physics	2021	0022- 2291	https://www.springer.com/journal/10909	https://link.springer.com/article/10.1007/s10909-021-02611-w	Scopus
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5	An all metal nitride nanostructure configuration: Study and exploitation in efficient photo-detection	Deepshikha Gogoi et al	Physics	Journal of Alloys and Compounds (Elsevier)	2021	0925-8388	https://www.journals.elsevier.com/journal-of-alloys-and-compounds	https://www.sciencedirect.com/science/article/abs/pii/S0925838821018697	Web of Science
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Synthesis of copper containing polyaniline composites through interfacial polymerisation: An effective catalyst for Click reaction at room temperature

Mitali Chetia ^{a, b, 1}, Manashjyoti Konwar ^{a, c, 1}, Biswajit Pegu ^a, Surajit Konwer ^a, Diganta Sarma ^a

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TGA and DTG analyses

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Appendix. Supplementary materials



Synthesis of copper containing polyaniline composites through interfacial polymerisation: An effective catalyst for Click reaction at room temperature

Mitali Chetia ^{a, b, 1}, Manashjyoti Konwar ^{a, c, 1}, Biswajit Pegu ^a, Surajit Konwer ^a, Diganta Sarma ^a

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TeV scale resonant leptogenesis with $L_\mu - L_\tau$ gauge symmetry in light of the muon $g - 2$

Debasish Borah, Arnab Dasgupta, and Devabrat Mahanta
Phys. Rev. D **104**, 075006 – Published 4 October 2021



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ABSTRACT

Motivated by the growing evidence for the possible lepton flavor universality violation after the first results from Fermilab's muon $g - 2$ measurement, we revisit one of the most widely studied anomaly free extensions of the standard model namely, gauged $L_\mu - L_\tau$ model, to find a common explanation for muon $g - 2$ as well as baryon asymmetry of the universe via leptogenesis. The minimal setup allows TeV scale resonant leptogenesis satisfying light neutrino data while the existence of light

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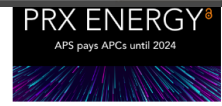
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Theoretical Study on Various Contributions to the Magnetization of $\text{Pb}_{1-x}\text{Mn}_x\text{S}$ and $\text{Pb}_{1-x}\text{Mn}_x\text{Se}$

H. Roy¹ · R. L. Hota²

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Abstract

Three different contributing mechanisms have been considered to calculate the magnetization (M) of p -type $\text{Pb}_{1-x}\text{Mn}_x\text{Se}$ for a hole density of $p = 5 \times 10^{18} \text{ cm}^{-3}$ and n -type $\text{Pb}_{1-x}\text{Mn}_x\text{S}$ for an electron density of $n = 6 \times 10^{18} \text{ cm}^{-3}$. The first mechanism comes from the valence band diamagnetism which is calculated in a frame of the two-band model. The second mechanism which we consider arises from the spin densities of holes and electrons and we use a six-level $\vec{k} \cdot \vec{\pi}$ theory in second-order perturbation theory in the effective mass representation. The third mechanism is the impurity Mn^{+2} ions contribution, and we consider small clusters consisting of one, two and three spins to evaluate it. The three spin clusters include both open and closed types. It has been observed that the former two mechanisms contribute very little to the magnetization compared to the latter one. However, their importance cannot be ignored because they provide a deeper understanding of the underlying physical mechanisms involved with carrier spin polarization and orbital diamagnetism of the host matrix, in which the Mn^{+2} spins are embedded. Good agreement of our theory with experiment is the other interesting and distinct feature of this work.

Keywords Orbital diamagnetism · Carrier spin polarization · $S(p)$ - d hybridization · Dilute magnetic semiconductors · Local moment magnetization

1 Introduction

PbS and PbSe are the first and second prototype members of the lead salt family, respectively. Galena, the popular name of natural PbS , fascinated the scientific community before it was identified as a semiconducting material and even before the advent of quantum physics [1]. The first diode detector and crystal radio receiver

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On different contributions to the magnetization of $\text{Pb}_{1-x}\text{Mn}_x\text{S}$ and $\text{Pb}_{1-x}\text{Mn}_x\text{Se}$ RECEIVED
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12 August 2021Hitoram Roy¹ and R L Hota² ¹ Department of Physics, Abhayapuri college, Abhayapuri, Assam—783381, India² Department of Physics, Central Institute of Technology, Kokrajhar, Assam—783370, IndiaE-mail: rlhota@yahoo.com**Keywords:** orbital diamagnetism, carrier spin polarization, s(p)-d hybridization, dilute magnetic semiconductors, local moment magnetization**Abstract**

Three different contributing mechanisms were considered to calculate the magnetisation (M) of p -type $\text{Pb}_{1-x}\text{Mn}_x\text{Se}$ and n -type $\text{Pb}_{1-x}\text{Mn}_x\text{S}$. The first mechanism comes from the valence band diamagnetism which is calculated in the frame of a two-band model; the second mechanism which we consider arises from the spin densities of holes and electrons and we use a six-level $\vec{k} \cdot \vec{\pi}$ theory in the second-order perturbation theory in the effective mass representation. The third mechanism is the impurity Mn^{+2} ion contribution, and we consider small clusters consisting of one, two and three spins to evaluate it. The three spin clusters include both open and closed types and it was observed that the former two mechanisms contribute very little to the magnetisation compared to the latter. However, their importance cannot be ignored because they provide a deeper understanding of the underlying physical mechanisms involved in carrier spin polarisation and orbital diamagnetism of the host matrix in which the Mn^{+2} spins are embedded. Good agreement between our theory and the experiment is another interesting and distinct feature of this work.

1. Introduction

PbS and PbSe are the first and second prototype members of the lead salt family or lead chalcogenides, respectively. Galena, the popular name of natural PbS, fascinated the scientific community before identified as a semiconducting material and even before the advent of quantum physics [1]. The first diode detector and crystal radio receiver were made by using galena [2]. Pioneering research on IV–VI chalcogenides can be traced back to the early seventies after the realisation of their potential applications in optoelectronic devices operating in the mid-infrared range [3]. Since then, these materials have occupied a central position in the arena of condensed matter physics research and still enjoy ongoing research activities being done on them in the field of topological insulators and thermoelectric devices [4, 5].

These binary non-magnetic semiconductors, when doped with either transition or rare-earth metal ions, give rise to the formation of deep magnetic impurity states in their non-magnetic matrix. The random distribution of these substitutional magnetic impurities causes them to localise in the lattice sites with $S = 5/2$ (for Mn^{+2} impurities) owing to the quenching of orbital angular momentum and following Hund's rule. As a result, these compounds are considered to be relatively new hybridised systems consisting of electronic and magnetic subsystem units and hence acquire the name semimagnetic semiconductors (SMSCs) or diluted magnetic semiconductors (DMSs). The II–VI based DMSs were the first to attract attention and there is a considerable amount of research in these materials [6, 7]. However, of late the IV–VI based materials have also become the focus of attention [8]. The common element in the magnetic properties of both types of DMSs is that these are closely related to the interactions between the magnetic ions. However, in IV–VI DMSs the importance of the electronic system is no less. This stems from the fact that the host systems such as the lead salts and SnTe and their ternary compounds are degenerate semiconductors with carrier densities varied up to 10^{21} cm^{-3} . Furthermore, strong inter-band and spin–orbit interactions are responsible for pronounced magnetic properties, such as large diamagnetism, chemical shift [9] and indirect spin–spin interaction in these materials [10].

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Pyro-phototronic application in the Au/ZnO interface for the fabrication of a highly responsive ultrafast UV photodetector

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Low scale leptogenesis and dark matter in the presence of primordial black holes

Suruj Jyoti Das¹, Devarbrat Mahanta¹ and Debasish Borah¹

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[Journal of Cosmology and Astroparticle Physics](#), Volume 2021, November 2021

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DOI 10.1088/1475-7516/2021/11/019

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Abstract

We study the possibility of low scale leptogenesis along with dark matter (DM) in the presence of primordial black holes (PBH). For a common setup to study both leptogenesis and DM we consider the minimal scotogenic model which also explains light neutrino mass at radiative level. While PBH in the mass range of $0.1-10^5$ g can, in principle, affect leptogenesis, the required initial PBH fraction usually leads to overproduction of scalar doublet DM whose thermal freeze-out occurs before PBH

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