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Referee report on the thesis  
**High mobility two-dimensional electron gas in CdTe quantum wells:**  
**High magnetic field studies**  
by Mgr. Jan Kunc


The doctoral thesis of Jan Kunc reports on results obtained within *en co-tutelle* doctoral studies at the Université de Grenoble and the Charles University in Prague. The goal of the thesis is the study of magneto-optic and magneto-transport properties of a two-dimensional electron gas confined in asymmetrically modulation doped quantum wells based on II-VI compound of CdTe. The experiments build on an excellent equipment being at disposal in the Grenoble High Magnetic Field Laboratory, where the measurements at high magnetic field up to 28T and at low temperature down to 40 mK were possible. The experimental techniques involve especially the measurements of magneto-photoluminescence and longitudinal and Hall resistance being completed by far infrared magneto-absorption, Raman scattering and photoluminescence excitation measurements.

The thesis presents a lot of original experimental results, which significantly improve the understanding of the complicated physical systems ruled by many-body interactions. The most remarkable experimental results may be found in Chapters 6-8, where I would like to highlight especially the measurement of temperature evolution of longitudinal resistivity of electron gas in CdTe/CdMgTe quantum well shown in Fig. 6.21, where integer filling factors 2, 3, 4 and 5 together with fractional filling factors  $4/3$ ,  $5/3$ ,  $7/3$  and  $8/3$  are seen. Another excellent results are presented in Figs. 7.15 - 7.18 illustrating an effect of spin gap enhancement mediated by many-body interaction. The latter experiment was also successfully described by an original model. Though the findings pointed above have been published in reputable journals already, the list of results deserving dissemination is much wider and the ongoing publishing is highly advisable.

The thesis is written with intelligible English and it is well arranged. Author has proven good insight into complicated physical systems and mastered multiple experimental techniques as well as theoretical models employed at the interpretation of results. He has also actively developed new models and in many cases he found the explanation of observed effects.

I have no objections against experimental methods, sample design and preparation, experimental results and their interpretation. The thesis proves the author's ability for independent creative scientific activity. I recommend the thesis to be accepted and to award Mgr. Jan Kunc the Ph.D. degree.

Prague, 6 January 2011

  
Doc. RNDr. Roman Grill, CSc.  
Charles University in Prague  
co-supervisor

## EVALUATION

Nom du rapporteur : Roman Grill  
(*Name of the referee*)

Nom du doctorant : Jan Kunc  
(*Name of the candidate*)

Niveau scientifique :	Satisfaisant	Bon	Très bon	Exceptionnel
<i>Mark</i>	<i>Satisfactory</i>	<i>Good</i>	<i>Very good</i>	<i>Exceptionnel</i>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



NOTE A L'ATTENTION  
DES RAPPORTEURS SUR LES TRAVAUX DES CANDIDATS AU DIPLOME DE  
DOCTORAT DE L'UNIVERSITE de GRENOBLE

Il est demandé aux rapporteurs qui établissent les rapports préalables de bien vouloir compléter la grille d'évaluation suivante et de la joindre à leur rapport : (merci de respecter cette grille, sans ajouter d'autres items)

Nom du rapporteur :	Roman GRILL			
Nom du doctorant :	Jan KUNE			
Niveau scientifique :	Satisfaisant	Bon	Très bon	Exceptionnel
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>