

Die Georg-August-Universität Göttingen

unter der Präsidentin

Professorin Dr. rer. physiol. Dr. h. c. Ulrike Beisiegel

verleiht

durch die Mathematisch-Naturwissenschaftliche Promotionsschule

Georg-August University School of Science (GAUSS)

unter dem Sprecher

Professor Dr. rer. nat. Reiner Kree

Herrn

Giovanni Marelli

geboren am 14. August 1983 in Desenzano del Garda (BS)

den Grad eines

Doktors der Naturwissenschaften (Dr. rer. nat.)

nachdem er in ordnungsgemäßem Verfahren

im GAUSS-Promotionsprogramm „Physics of Biological and Complex Systems“

durch die Dissertation

„Minimal models for lipid membranes: local modifications around fusion objects“

sowie durch die Disputation vom 21. Januar 2013

seine wissenschaftliche Befähigung erwiesen hat.

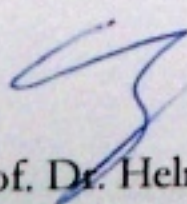
Er hat die Promotion im Rahmen der

International Max Planck Research School

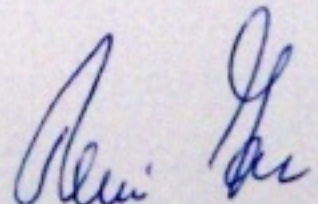
„IMPRS for Physics of Biological and Complex Systems“ durchgeführt.

Göttingen, den 21. Januar 2013




Prof. Dr. Helmut Grubmüller
Sprecher der IMPRS




Prof. Dr. Reiner Kree
Sprecher von GAUSS



The Georg-August-Universität Göttingen

awards

Mr.

Giovanni Marelli

born on 14. August 1983 in Desenzano del Garda (BS)

the degree

"Doktor der Naturwissenschaften" (Dr. rer. nat.)

under the President

Professor Dr. rer. physiol. Dr. h. c. Ulrike Beisiegel

through the Georg-August University School of Science (GAUSS)

under the Dean

Professor Dr. rer. nat. Reiner Kree.

He proved his scientific qualifications
according to the regulations of the GAUSS doctoral programme
"Physics of Biological and Complex Systems"

by completing his doctoral thesis (Dissertation)
entitled

"Minimal models for lipid membranes: local modifications around fusion
objects"

and thesis defence (Disputation),
dated 21 January 2013

She graduated from the International Max Planck Research School
"IMPRS for Physics of Biological and Complex Systems".

Göttingen, 21 January 2013

Signed: Prof. Dr. Helmut Grubmüller
Speaker of the IMPRS


Signed: Prof. Dr. Reiner Kree
Speaker of GAUSS

The correctness and completeness of the translation overleaf of the Dr. rer. nat. certificate into the English language is hereby confirmed. The translation may be used solely in combination with the original document.

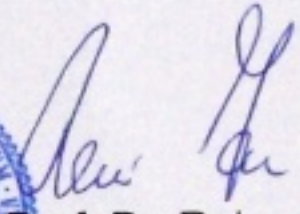
Göttingen, 9 December 2013

Georg-August-Universität Göttingen




Prof. Dr. Helmut Grubmüller
Speaker of the IMPRS




Prof. Dr. Reiner Kree
Speaker of GAUSS



UNIVERSITÀ DEGLI STUDI DI PADOVA



CE032

Servizio Segreterie Studenti

Cert. n. 2008695523

Matr. 570423-SF

Si certifica che MARELLI GIOVANNI, nato a Desenzano Del Garda (Brescia) il giorno 14/08/1983, ha superato la prova finale del Corso di laurea Specialistica in Fisica il giorno 17/03/2009 riportando punti CENTOCINQUE sopra CENTODIECI (105/110) e, ai sensi del D.M. 270 del 22 ottobre 2004, e' Dottore Magistrale in Fisica, Classe 20/S delle lauree specialistiche in Fisica, secondo il D.M. 28 novembre 2000, con il seguente piano di studio:

	Voto	Val
CO 22/12/2006 RICONOSCIMENTO CARRIERA PREGRESSA	CONVALIDATO	181.00
! 10/07/2007 LABORATORIO DI FISICA A	30/30	6.00
! 11/07/2007 MECCANICA STATISTICA	27/30	5.00
! 24/07/2007 LABORATORIO DI FISICA DELLA MATERIA 1	30/30	5.00
! 21/09/2007 FISICA DELLO STATO SOLIDO	27/30	6.00
! 28/09/2007 ISTITUZIONI DI FISICA SUBNUCLEARE	26/30	6.00
! 03/10/2007 FISICA TEORICA	28/30	6.00
! 20/12/2007 LABORATORIO DI FISICA DELLA MATERIA II	30/30	5.00
! 12/01/2008 SEGNALI E RUMORE	30/30	6.00
! 24/07/2008 ISTITUZIONI DI ASTROFISICA E COSMOLOGIA	24/30	5.00
! 01/08/2008 TEORIA DEI CAMPI NON RELATIVISTICA	29/30	6.00
! 29/09/2008 STRUTTURA DELLA MATERIA	20/30	6.00
! 07/01/2009 ELETTRODINAMICA	23/30	5.00
! 07/01/2009 MECCANICA STATISTICA 2	28/30	6.00
! 07/01/2009 ELEMENTI DI INFORMATICA E ANALISI DATI	APPROVATO	3.00
! 07/01/2009 METODI MATEMATICI	21/30	6.00
! 17/03/2009 PROVA FINALE		39.00
Totale		302.00

Il valore si intende espresso in Crediti Formativi Universitari.

LEGENDA: CO=Convalidato

Il Corso di Laurea Specialistica ha durata normale di due anni, richiede l'acquisizione di 300 Crediti Formativi Universitari, ivi compresi quelli già acquisiti dallo studente e riconosciuti validi per il relativo corso, ed afferisce alla Facoltà di Scienze MM.FF.NN..

Si rilascia in carta resa legale (apporre la marca secondo il valore vigente, pena la non validità dell'atto).

Il presente certificato viene rilasciato a norma dell'art.3 comma 2 del D.L.vo 12.02.1993 n.39.

Padova, 19/03/2009

UNIVERSITÀ DEGLI STUDI DI PADOVA

La firma che precede è stata apposta da
 **Div. Segreterie Studenti** dipendente
 **Andrea RIGONI**
 dell'Università degli Studi di Padova assegnato/a al Servizio Segre-
 terie Studenti e risulta depositata presso la Prefettura di Padova
 per le finalità di cui all'art. 33, comma 1 del D.P.R. n. 445/2000.
 Padova, **19 MAR. 2009**

Per

IL CAPO SERVIZIO
 DONATO SIGOLO

UNIVERSITÀ DEGLI STUDI DI PADOVA
 Servizio Segreterie Studenti
 Dott. Andrea RIGONI

UNIVERSITÀ DEGLI STUDI DI PADOVA
 Servizio Segreterie Studenti
 Dott. Andrea RIGONI

Università degli studi di Padova

CE032

Service of the Student's Secretary

Cert. n. 2008695523

Matr. 570423-SF

We certify that *GIOVANNI MARELLI*, born in Desenzano del Garda (Brescia) on the 14th of August of 1983, has successfully achieved the final test of the course of the master degree in Physics on the 17th of March of 2009 merit *ONEHUNDREDANDFIVE* over *ONEHUNDREDANDTEN* and, referring to the ministerial decree 270 dated the 22th of October 2004, is Master Doctor in Physics, Class 20/S of the master degree in physics, according to the ministerial decree 28 November 2000, with the following subject matters:

			Mark	Val
CO	22/12/2006	Acknowledgement of the former career	Confirmed	181.00
	10/07/2007	Laboratory of physics A	30/30	6.00
	11/07/2007	Statistical Mechanics	27/30	5.00
	24/07/2007	Physics of Matter Laboratory 1	30/30	5.00
	21/09/2007	Solid State Physics	27/30	6.00
	28/09/2007	Institutes Of subnuclear Physics	26/30	6.00
	03/10/2007	Theoretical Physics	28/30	6.00
	20/12/2007	Physics of Matter laboratory II	30/30	5.00
	12/01/2008	Signals and Noise	30/30	6.00
	24/07/2008	Institutes of Astrophysics and Cosmology	24/30	5.00
	01/08/2008	Non Relativistic Field Theory	29/30	6.00
	29/09/2008	Structures of Matter	20/30	6.00
	07/01/2009	Electrodynamics	23/30	6.00
	07/01/2009	Statistical Mechanics 2	28/30	6.00
	07/01/2009	Elements of Computer Science and Data Analysis	Approved	3.00
	07/01/2009	Mathematical Methods	21/30	6.00
	17/03/2009	Final Test		39.00
Total			302.00	

Meaning the value expressed in formative university credits. LEGEND: CO= Confirmed

The Course of the Master Degree lasts two years, requires the acquiring of 300 university formative credits, with those already acquired by the student and recognised valid for the relative course and concern the department of Mathematical, Physics and Natural Science.

We release paper rendered legal (affix the revenue stamp depending on the value in force, otherwise the act is not valid).

This certificate is released according to law 3 sub-section 2 of the decree law 12.02.1993 n.39.

Padova, 19/03/2009



REPUBBLICA ITALIANA
**MINISTERO DELL'ISTRUZIONE,
 DELL'UNIVERSITÀ E DELLA RICERCA**
 MINISTRY OF EDUCATION, UNIVERSITY AND RESEARCH - MINISTÈRE DE L'INSTRUCTION, DE L'UNIVERSITÉ
 ET DE LA RECHERCHE - MINISTERIUM FÜR UNTERRICHT, WISSENSCHAFT UND FORSCHUNG
 MINISTERIO DE EDUCACIÓN, UNIVERSIDAD E INVESTIGACIÓN

ANNO SCOLASTICO 2001 / 2002
 SCHOOL YEAR - ANNÉE SCOLAIRE - SCHULJAHR - AÑO ESCOLAR

ISTITUTO LICEO SCIENTIFICO STATALE con Sezione CLASSICO - LINGUISTICO
 SCHOOL type of institute
 ÉTABLISSEMENT (kind of school)
 SCHULE (type of establishment)
 INSTITUTO (type of institute)

" ENRICO FERMI " di " SALÒ "
 (name of school) (model)
 (denomination) (town)
 (thema) (subject) (locality)

DIPLOMA

DI SUPERAMENTO DELL'ESAME DI STATO CONCLUSIVO DEL CORSO DI STUDIO DI
 DIPLOMA CERTIFYING THE RESULTS OF THE STATE EXAM AT THE END OF THE COURSE OF STUDIES IN
 DIPLOME ATTESTANT LA RÉUSSITE À L'EXAMEN D'ÉTAT DE FIN D'ÉTUDES SECONDAIRES, SÉRIE
 DIPLOM ÜBER DIE BESTANDENE STAATLICHE ABSCHLUSSPRÜFUNG AN DER OBERSCHULE
 DIPLOMA DE SUPERACIÓN DEL EXAMEN DE ESTADO QUE FINALIZA LOS ESTUDIOS DE

LICEO SCIENTIFICO

CONFERITO A GIOVANNI MARELLI
 CONFERRED ON
 CONFÉRÉ À
 VERLIEHEN AN
 CONCEDIDO A

NAT. o. A. DESENZANO DEL GARDA (PROV. DI BS)
 BORN IN (DISTRICT OF)
 NÉ(E) À (PROVINCE DE)
 GEBOREN IN (PROV.)
 NACIDO/A EN (PROVINCIA DE)

IL GIORNO 14 Agosto 19 83
 ON
 LE
 AM
 EL DÍA

CON LA SEGUENTE VOTAZIONE COMPLESSIVA:
 WITH THE FOLLOWING COMPREHENSIVE MARK:
 AVEC LA NOTE GLOBALE SUIVANTE:
 MIT FOLGENDER GESAMTBEWERTUNG:
 CON LA SIGUIENTE CALIFICACION GLOBAL:

novantuno CENTESIMI
 (in letters) HUNDREDTHS
 (in letters) 100
 (in chiffres) HUNDERTSTEL
 (in letters) CENTESIMAS

SALÒ addi 9/07/2002

N. 0046756

IL PRESIDENTE DELLA COMMISSIONE
 PRESIDENT OF BOARD OF EXAMINERS
 LE PRÉSIDENT DU JURY
 DER VORSITZENDE DER KOMMISSION
 EL PRESIDENTE DEL TRIBUNAL

LUIGI BETTONI



Prof. Dr. M. Müller
Institut für Theoretische Physik,
Friedrich-Hund-Patz 1, D-37077 Göttingen, Germany

GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN



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Prof. Dr. Marcus Müller

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Fax: (0551)39-9631
E-Mail: glormann@theorie.physik.uni-goettingen.de

Re: Letter of Recommendation for Giovanni Marelli for the Premio Marco Fontana

15. Juni 2012

Dear selection committee:

It is a great pleasure to recommend Giovanni Marelli for the *Premio Macro Fontana* for his excellent Master thesis.

I know Giovanni Marelli since fall 2008, when he was an exchange student in my group at the Institute of Theoretical Physics. In his project in Göttingen, which is part of his Master thesis, he studied the structure and thermodynamics of hydrophobic nanoparticles in lipid membranes by computer simulations of a solvent-free, coarse-grained model. The study was motivated by experiments of Michael Maskos at the Gutenberg-University in Mainz, Germany, who observed that a lipid bilayer can incorporate only nanoparticles with a radius that is smaller than a quarter of the hydrophobic thickness, while larger nanoparticles are expelled and may rupture the membrane. Giovanni developed a coarse-grained representation of a hydrophobic nanoparticle, relating the model parameters to experimental characteristics like Hamaker constants and surface tension, and studied the membrane deformation by the nanoparticle. Additionally, he constructed a stability diagram of the nanoparticle in the lipid membrane by computer simulation, observing whether or not the nanoparticle remains localized in the membrane core over a predefined time period. The simulations qualitatively reproduced the experiments and provided insights into the local structure. The model has also been a starting point for further investigations of membrane inclusions (e.g., peptides).

I was impressed with Giovanni's enthusiasm and he continued as a Ph.D student in my group. He is expected to obtain his Ph.D by the end of 2012 and is co-author of 2 publications in Physical Review Letters and PLoS ONE about collective phenomena in lipid membranes. He is very interactive and has stimulated discussions with researchers in Göttingen. For instance, he has compared the structure of "stalks" – hour-glass shaped passages between membranes that are crucial intermediates of membrane fusion – in different coarse-grained models and experiments of Prof. Tim Salditt, in order to establish that the stalk structure is indeed universal, i.e. independent from the details of the model.

Thus, I recommend that Giovanni be awarded the honor *Premio Macro Fontana*.

Sincerely

Marcus Müller



Prof. Dr. M. Müller
Institut für Theoretische Physik, Friedrich-Hund-Platz 1 D-37077 Göttingen

To whom it may concern

Prof. Dr. Marcus Müller

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E-Mail: mmueller@theorie.physik.uni-goettingen.de
Sekretariat: (0551)39-7989
Fax: (0551)39-9631
E-Mail: giormann@theorie.physik.uni-goettingen.de

March 3, 2009

RE: review of Giovanni Marelli's master thesis

It is a great pleasure to report on the master thesis of Giovanni Marelli, who stayed as a Erasmus exchange student from September 2008 until February 2009 in the Computational Soft Matter Group at the Institut für Theoretische Physik of the Georg-August Universität, Göttingen, Germany.

In his thesis Giovanni Marelli studied the stability of a hydrophobic nano-particle in the interior of a bilayer membrane. This subject is motivated by recent experimental efforts in the group of Prof. Maskos in Mainz to embed functional nanoparticles into polymer vesicles (polymersomes). To explore the behavior of nano-particles in a bilayer membrane, Giovanni Marelli used a coarse-grained representation of the membrane and the nano-particle with an implicit solvent, and he studied the stability of the nano-particle by computer simulation as a function of the particle's size and interaction with the hydrophobic component of the amphiphiles. For very small sizes or weak interaction, the nano-particle is not confined into the hydrophobic interior of the membrane and there is a rapid exchange of nano-particles between the solvent and the hydrophobic region. For intermediate size, the nano-particle is enclosed in the membrane's interior and the bilayer slightly deforms to wrap the inclusion. For larger sizes, however, the bilayer's distortion would be prohibitive and the nano-particle is expelled from the membrane. These interesting findings are in qualitative agreement with experiments in the Maskos group.

During the six month in Göttingen, Giovanni Marelli, interacted productively with the members of my group and acquired a variety of simulation techniques and background knowledge about modeling of polymer and lipid systems. Given the limited time, it was a challenging project and I am pleased with the results. Thus, I recommend this master thesis to be accepted.

Sincerely,

(Marcus Müller)

SEMESTERSCHEIN

Herr Giovanni MARELLI

hat im Wintersemester 2008/09 an der Sprachlehrveranstaltung

Grammatik - Mittelstufe

mit 4 Semesterwochenstunden (SWS) an 46 von insgesamt 52 Stunden (88 %) teilgenommen.

Er hat die folgende Leistung erbracht:

Drei Kurztests und Mitarbeit im Unterricht.

Er erhält für Anwesenheit und Leistung 6 credit points/point.

Seine Leistung wurde mit folgender Note: C Gut (71 %) bewertet.

Name der/des Lehrenden: Sylvia Mattauch

Göttingen, den 29.01.2009



(Unterschrift)

(Siegel)