

Frank Willem Jan Hekking

28 Sept. 1964 - 15 May 2017



Frank Hekking:

An Illustrated CV Covering Frank's PhD and Postdoc Periods

Gerd Schön

Karlsruhe Institute of Technology



Universität
Karlsruhe (TH)



UNIVERSITY OF MINNESOTA



UNIVERSITY OF
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BOCHUM

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UNIVERSITÉ
Grenoble
Alpes

Born: September 28, 1964, **Utrecht** – Netherlands

Family moved to Zierikzee, high school education in **Goes** until 1982

1982- 1988 studies of physics at Rijks-Universiteit **Utrecht**

experimental work on 2D spin glasses with prof. H.W. de Wijn

May 1988: Master degree in theoretical physics with prof. M.H. Ernst

1988-1991: PhD work at TU **Delft**



- 1988-1991: Delft University of Technology
my 1st “regular” PhD student

February 1992: PhD degree at Delft University of Technology (The Netherlands).



**Aspects of electron transport
in
semiconductor nanostructures**

Proefschrift ter verkrijging van de graad van doctor
aan de Technische Universiteit Delft,
op gezag van de Rector Magnificus, prof. drs P.A. Schenck,
in het openbaar te verdedigen ten overstaan van een commissie
aangewezen door het College van Dekanen op

donderdag 6 februari 1992 te 16.00 uur

door

Frank Willem Jan Hekking,

geboren te Utrecht,

doctorandus in de natuurkunde.

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Chapter 2

Transport through a finite one-dimensional crystal (240)

Leo P. Kouwenhoven, Frank W. J. Hekking, Bart J. van Wees, ... Phys. Rev. Lett. **65**, 361 (1990)

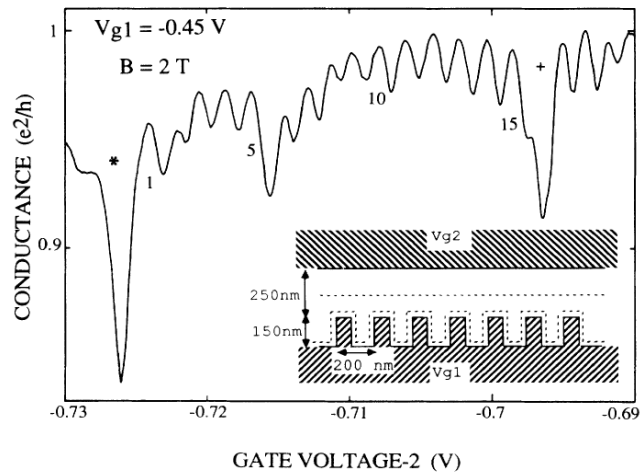


FIG. 2. Conductance as a function of gate voltage $2 V_{g2}$ on the second gate at 2 T and $V_{g1} = -0.45$ V on the first gate. The inset schematically shows the gate geometry; the dashed lines indicate the depletion regions in the 2DEG. The upper depletion region is moved towards the fingers when V_{g2} is made more negative.

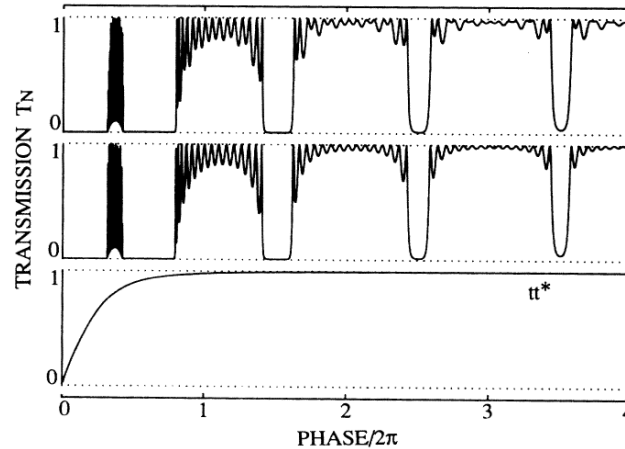


FIG. 3. Calculations from Eq. (1) of the transmission T_N as a function of phase θ of a 1D chain of $N=16$ barriers. The lowest curve shows the simultaneously varying transmission probability tt^* through a single barrier. In the middle curve all barriers are taken equal, while in the upper curve a small amount of disorder is included by one deviating barrier.



Leo Kouwenhoven
and Bart van Wees

Chapter 3

Influence of the electrodynamic environment on quantum adiabatic transport (18)

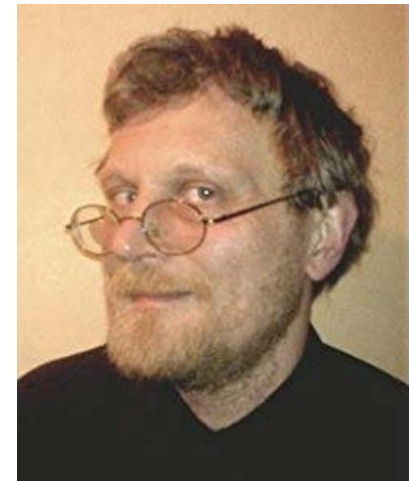
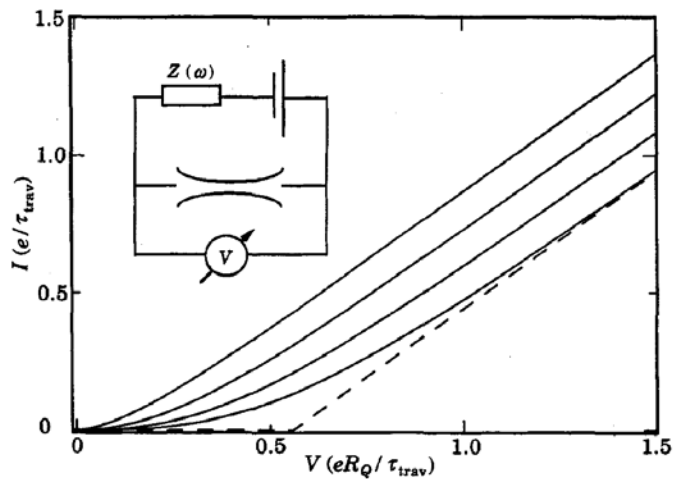
Frank W. J. Hekking, Yuly V. Nazarov, Gerd Schön, Europhys. Lett. **14**, 489 (1991)

Suppression of quantized conductance by a resistive environment (13)

Frank W. J. Hekking, Yuly V. Nazarov, Gerd Schön, Europhys. Lett. **20**, 255 (1992)

F. W. J. HEKKING *et al.*: SUPPRESSION OF QUANTIZED CONDUCTANCE ETC.

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Yuli Nazarov

Fig. 1. - The current as a function of voltage over the constriction, for a resistive environment $Z(\omega) = R_s$ for (from right to left) $R_s/R_Q = 2.0, 1.5, 1.0,$ and 0.5 . We consider completely transmitting states (*i.e.* $\bar{T}_{nE} = 1$) in the lowest subband ($n = 1$). The dotted line is an extrapolation of the Ohmic behaviour for $R_s/R_Q = 2.0$. The inset shows the constriction, connected to an ideal voltage source by leads with impedance $Z(\omega)$.

Chapter 4

Pauli pump for electrons (44)

Frank W. J. Hekking, Yuly V. Nazarov, Phys. Rev. B **44**, 9110 (1991)

Chapter 5

Photovoltaic effect in quantum adiabatic transport as a way to pump electrons (27)

Frank W. J. Hekking, Yuly V. Nazarov, Phys. Rev. B **44**, 11506 (1991)

Chapter 6

Nonlocal resistance oscillations near the superconducting transition (20)

Leonid I. Glazman, Frank W. J. Hekking, A. Zyuzin, Phys. Rev. B **46**, 9074 (1992)

Leonid Glazman



May 1991: 1 month at the Institute for Theoretical Physics, Santa-Barbara, CA



Excursion to
Crowley Lake
(East of Sierra Nevada)



successful search for Sage Grouse
(picture from the web)



**February 1992
PhD Defense in Delft**

with "Paranymfen"
Anne van Otterlo
and Mark Horbach



Summer 1991: move to Karlsruhe University
February 1992: defense of PhD thesis in Delft
1992-1994: Postdoc at Karlsruhe University



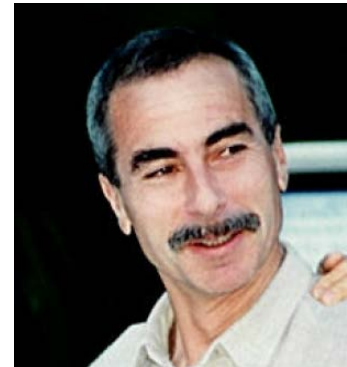
Universität
Karlsruhe (TH)





Institut für
Theoretische Festkörperphysik
early 90's

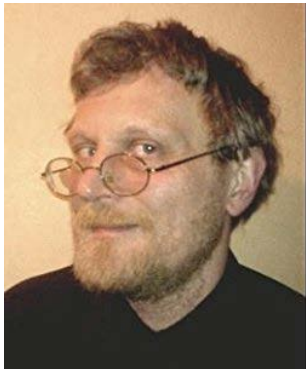
Some group members



me, ~ 25 years ago



the secretary Evmarie



Yuli Nazarov



Rosario Fazio



Arkadi Odintsov



Giuseppe Falci



Anne van Otterlo



Christoph Bruder



Herbert Schoeller



Andrei Zaikin



Karl-Heinz Wagenblast



Jens Siewert

Interference of electron tunneling into superconductor

Interference of two electrons entering a superconductor (175)

Frank W. J. Hekking, Yuly V. Nazarov, Phys. Rev. Lett. **71**, 1625 (1993)

Coulomb blockade of two-electron tunneling (104)

Frank W. J. Hekking, Leonid I. Glazman, K. A. Matveev, R. I. Shekhter, Phys. Rev. Lett. **70**, 4138 (1993)

Subgap conductivity of a superconductor--normal-metal tunnel interface (146)

Frank W. J. Hekking, Yuly V. Nazarov, Phys. Rev. B **49**, 6847 (1994)

Andreev Spectroscopy of Josephson Coupling (6)

Frank W. J. Hekking, Leonid I. Glazman, Gerd Schön, Phys. Rev. B **51**, 15312 (1995)



Interference of Two Electrons Entering a Superconductor

F. W. J. Hekking and Yu. V. Nazarov*

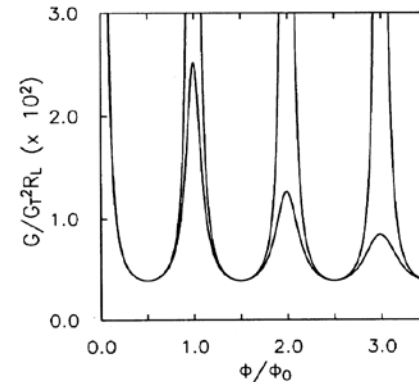
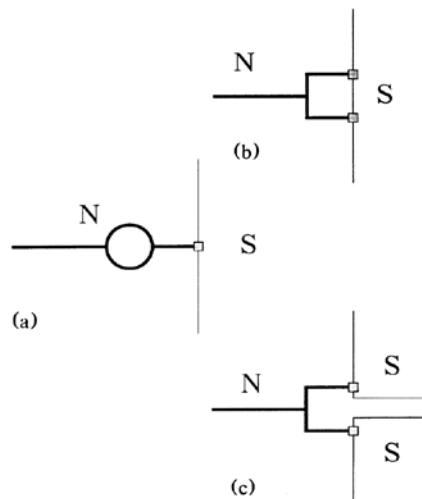


FIG. 2. Subgap conductance at zero temperature for the geometry of Fig. 1(a), as a function of flux. Curves correspond to Eqs. (7) (upper curve) and (8) (lower curve) in the text.

Luttinger liquid – superconductor heterostructures

Josephson current through a Luttinger liquid (70)

Rosario Fazio, Frank W. J. Hekking, A. A. Odintsov,
Phys. Rev. Lett. **74**, 1843 (1995)

DC and AC Josephson Effect in a Superconductor-Luttinger Liquid-Superconductor System (42)

Rosario Fazio, Frank W. J. Hekking, A. A. Odintsov, Phys. Rev. B **53**, 6653 (1996)

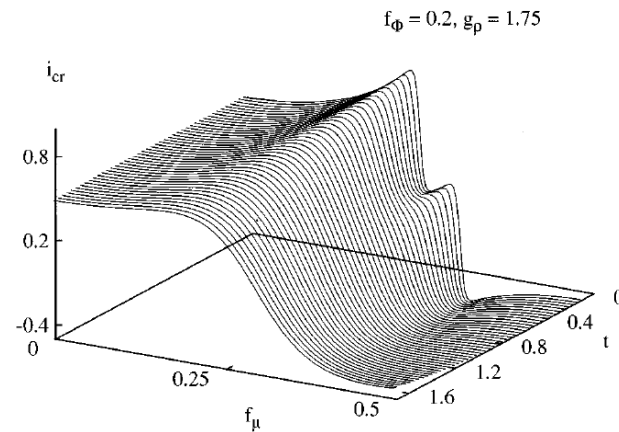
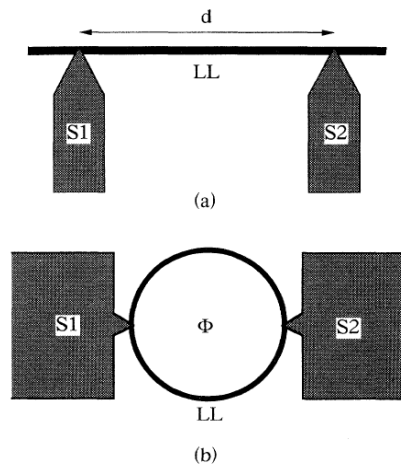
Anomalous density of states of a Luttinger liquid in contact with a superconductor (26)

C. Winkelholz, Rosario Fazio, Frank W. J. Hekking, Gerd Schön, Phys. Rev. Lett. **77**, 3200 (1996)



Josephson Current through a Luttinger Liquid

Rosario Fazio,^{1,2} F. W. J. Hekking,^{2,*} and A. A. Odintsov^{2,†}



Conference excursions to the Black Forreast

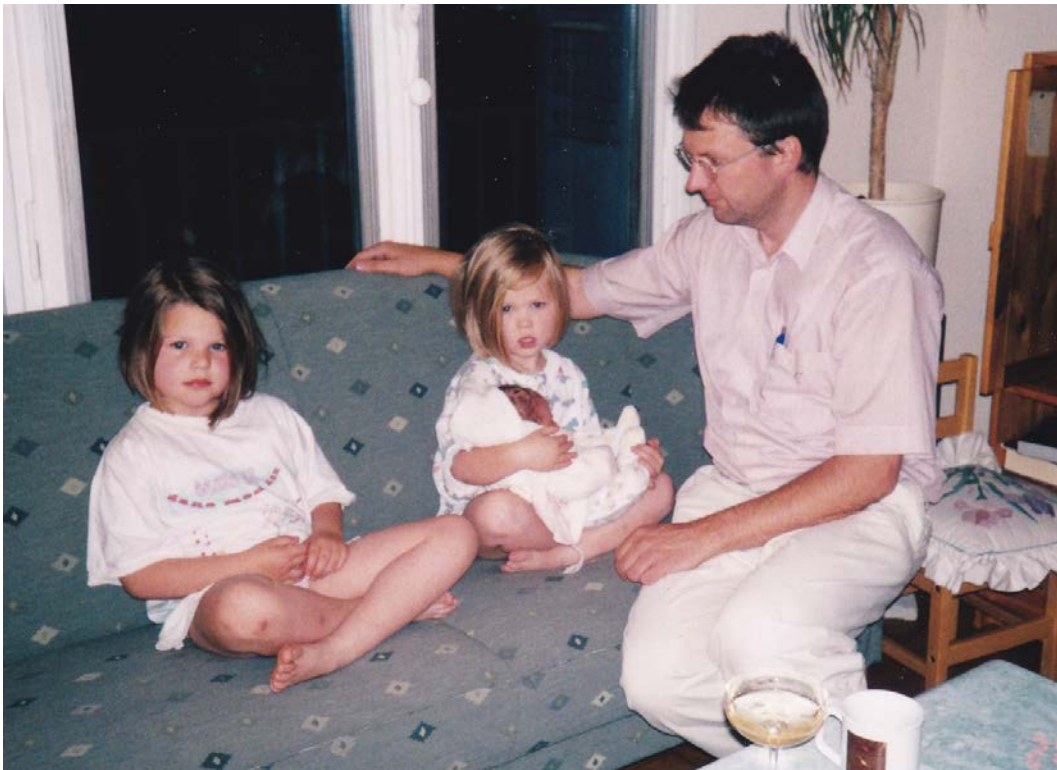






The family

Erika



Hannah born 1994 in Karlsruhe
Rebecca born 1996 in Cambridge
Sarah born 2000 in Grenoble

1994-1995: Postdoc with Leonid I. Glazman at University of Minnesota, Minneapolis



UNIVERSITY OF MINNESOTA



1996-1997: Postdoc with Dima E. Khmel'nitskii
at the Cavendish Laboratory, Cambridge – UK



1998-1999: Postdoc with Kostya Efetov at Bochum University

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BOCHUM

RUB



Quantum fluctuations in the equilibrium state of a thin superconducting loop (25)

Frank W. J. Hekking, Leonid I. Glazman, Phys. Rev. B **55**, 6551 (1997)



Anomalous thermal transport in quantum wires (55)

Rosario Fazio, Frank W. J. Hekking, David E. Khmel'nitskii, Phys. Rev. Lett. **80**, 5611 (1998)

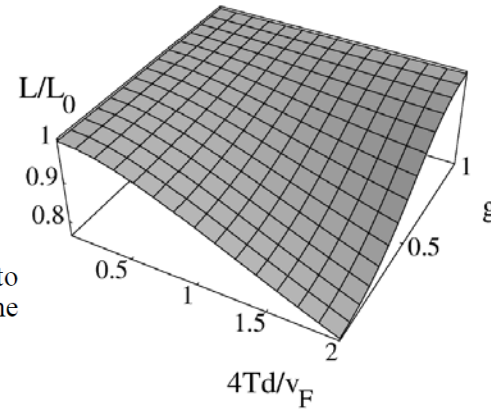


FIG. 2. The Lorentz number for an ideal wire attached to reservoirs is plotted as a function of the temperature and the interaction strength.



Influence of quantum fluctuations on phase coherent Andreev tunneling (19)

Andrea Huck, Frank W. J. Hekking, Bernhard Kramer, Europhys. Lett. **41**, 201 (1998)

Interaction constants and dynamic conductance of a gated wire (78)

Yaroslav M. Blanter, Frank W. J. Hekking, Markus Büttiker, Phys. Rev. Lett. **81**, 1925 (1998)



Andrea Huck & Bernhard Kramer



Yaroslav Blanter



Markus Büttiker

Magnetotunneling as a probe of Luttinger-liquid behavior (26)

Alexander Altland, C. H. W. Barnes, Frank W. J. Hekking, A. J. Schofield, Phys. Rev. Lett. **83**, 1203 (1999)

Spin-charge separation and Kondo effect in an open quantum dot (35)

Leonid I. Glazman, Frank W. J. Hekking, Anatoly I. Larkin, Phys. Rev. Lett. **83**, 1830 (1999)

Properties of superconductor-Luttinger-liquid hybrid systems (9)

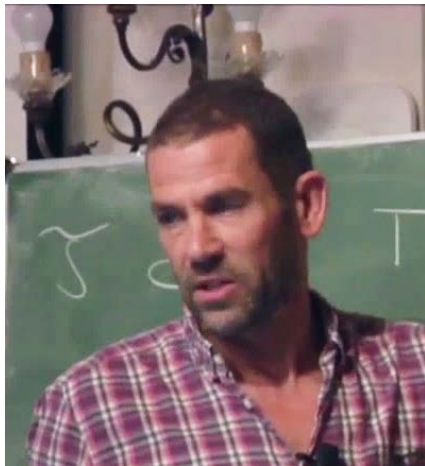
R. Fazio, F. W. J. Hekking, A. A. Odintsov, R. Raimondi, Superlattices & Microstructures **25**, 1163 (1999)

Thermodynamics and spectral properties of ultrasmall superconducting grains (13)

Giuseppe Falci, Rosario Fazio, Frank W. J. Hekking, A. Mastellone, J. Low Temp. Phys. **118**, 355 (2000)

Re-entrant spin susceptibility of a superconducting grain (44)

A. Di Lorenzo, R. Fazio, F.W.J. Hekking, G. Falci, A. Mastellone, G. Giaquinta, Phys. Rev. Lett. **84**, 550 (2000)



Alexander Altland



Anatoly I. Larkin



Roberto Raimondi



Giuseppe Falci

since May 1999: professor of theoretical condensed matter physics
at Joseph Fourier University (Grenoble – France)



My Continuing Contacts with Frank

2008 my 60th birthday party



2011 Ecole de Physique, Les Houches, Frontiers of Condensed Matter

2013 Ecole de Physique, Les Houches, Doctoral training:

Frontiers of condensed matter: nanosciences and energy