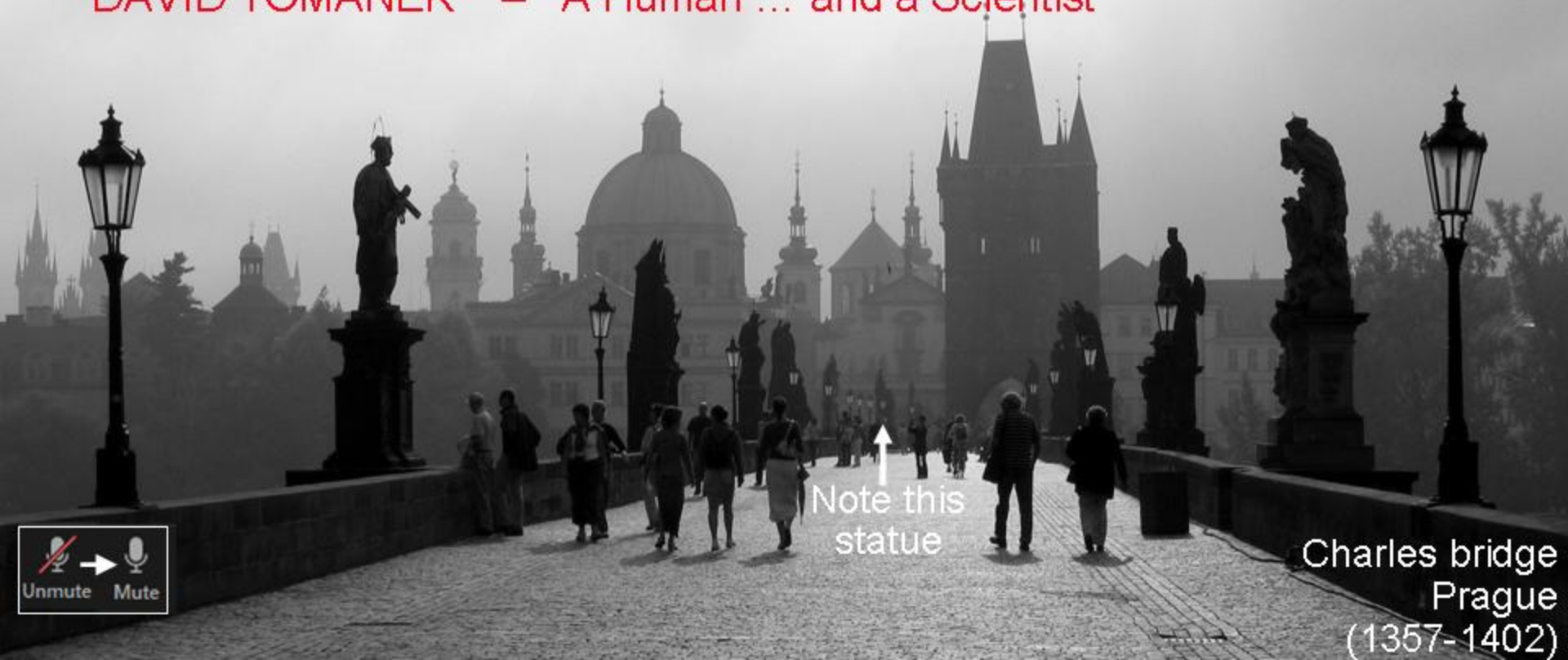


From Graduation to Retirement

DAVID TOMÁNEK – A Human ... and a Scientist



Note this
statue

Charles bridge
Prague
(1357-1402)



DAVID TOMÁNEK
– as a Human



I was born in Prague in 1954

This is the statue on the
Charles bridge I just
mentioned.

When you look at the
inscription at the bottom
of the statue ...

I was born in Prague in 1954

This is the statue on the Charles bridge I just mentioned.

When you look at the inscription at the bottom of the statue ...

... you will find the word

AB INITIO

(Latin: *from the beginning*)

I was destined to perform
ab initio
computer simulations

1954-1968 in communist Czechoslovakia

From Birth to Invasion

Born to play ...



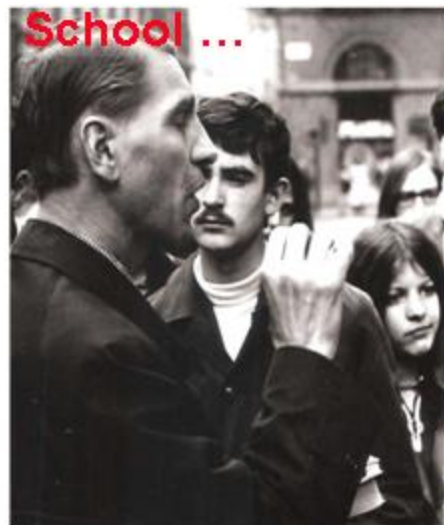
go to school...



... until tanks put an end to school



1968-1974 in Switzerland
School, ski, soldier, student



1974-1985 in West Berlin

PhD and Assistant Professor at FU Berlin

Department of Physics ...



... my PhD adviser ...



Karl-Heinz Bennemann

... who once went missing
for 2 years



Co-adviser: Alex Bradshaw



Freie Universität
Berlin



MAX-PLANCK-GESELLSCHAFT
Fritz-Haber-Institut

Fritz-Haber-Institut
Berlin

West Berlin was an interesting city



President Reagan asked here: "Mr. Gorbachev, tear down this wall!" (1987)

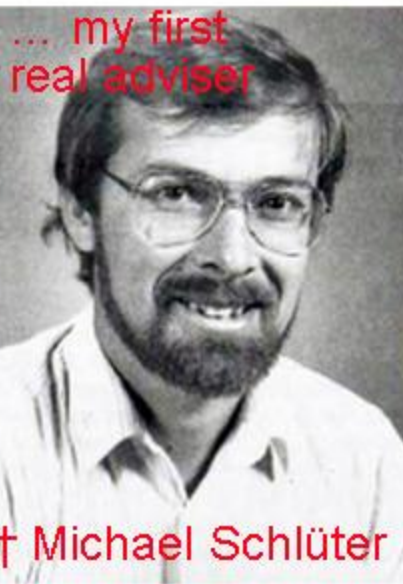


Subway station closest to the Department of Physics of the FU

1985

Post-Doc at Bell Labs

AT&T Bell Laboratories
Murray Hill



“In Nature, God solves the Schrödinger equation in real time, in double-precision. Why should we compete?”

(Paraphrased, based on memory)

“Theory is NOT supposed to give exact predictions. It is *expected to be wrong*. But we should understand why, and in what direction the prediction is wrong”.

(Paraphrased, based on memory)

1985 - 1987

Post-Doc at U.C. Berkeley

My (second) Post-Doc adviser ...



Steven G. Louie

The Bay view from my office would be spectacular ...



... if the Campanile would not block the view! ... and shut up!



Berkeley has many advantages

- It takes 3 hours *David* driving (every weekend) to Paradise: Yosemite National Park and South Lake Tahoe Desolation Wilderness



3 h 6 min (159.4 mi) via CA-120 W and I-580 W



3 h 6 min (178.3 mi) via US-50 W/EI Dorado Fwy and I-80 W



1987 - 2020

Professor of Physics at Michigan State University



We also have a carillon...
.. far away from my office

My office and my computers
shortly after joining MSU



I enjoy the Beauty of Michigan

... in any season:
In Fall



... and in Winter



I also enjoy all humans ... wherever they are

Walk with wise people in China, dance in Brazil,



get a drink in Helsinki,



hug a SWAT member in South Africa,



get a bamboo wife in Korea.



Above all ... I love Physics

I love to talk Physics,
in whatever outfit ...



PhD faculty opponent in
Helsinki (2007)

... and would even kill for it



Dr. Jani Kotakoski barely survived
his PhD defense

- I love to ...
 - meet people
 - listen to people
 - make people laugh
(I practiced in many languages)
 - discuss about *Physics, Nature, God, Art, History*
 - teach students to **think**, not just follow advice
 - uncover the **mysteries** of Nature
 - assist God in the continuing act of creation

- ... this brings me to the second, shorter Chapter



DAVID TOMÁNEK
– as a Scientist

PRL 99, 175503 (2007)

PHYSICAL REVIEW LETTERS



in a pattern we dub


“Tomanek’s spectacles”

- I will not bore you with my list of achievements (you can get it in my CV)
- The more interesting questions are *Why?* and *How?*



1980 – 2000

From surfaces to atomic clusters

- My PhD was in *Surface Science* 
- Atomic clusters are “*bulk surfaces*”: all atoms are under-coordinated
- Atomic *clusters* and atomic *nuclei* have much in common:
 - Both are finite-size Fermi systems
 - Both show magic numbers in stability
 - Both have plasmon excitations
 - I shared this excitement with a Nuclear Theorist, George F. Bertsch
- Discussing all this was worth organizing dedicated **ICW** workshops on



Electronic Excitations and Magnetism in Clusters (1992)



Excitations in Alkali Clusters (1991)



Clusters as a Local Probe of Bulk Phenomena (1993)



...



Millenium Cluster Workshop (2000)

... by 1995 everybody loved nano-carbon:
0D Buckyball (C_{60}) and other fullerenes



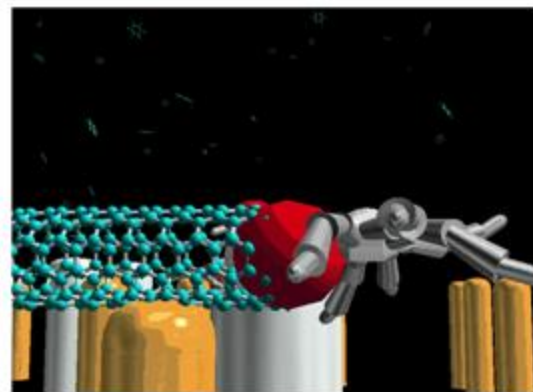
- I got to appreciate Rick Smalley in person – he was fun
 - My group studied the buckyball and other fullerenes theoretically (Seong-Gon Kim)
 - I heeded Rick Smalley's advice in 1994: *It is not buckyballs, it is **buckytubes** now*
- Rick Smalley passed away († 2005)
- Buckyballs passed away: no discussion, no applications, no funding
- I determined for myself: **1D Nanotubes shall not die** for lack of discussion and applications
- This is essentially why I organized **NTxx** nanotube conferences
- My group contributed a lot to our understanding of beloved *nanotubes*:
 - Record thermal conductivity (Savas Berber)
 - Growth mechanism (Rick Smalley, Young-Hee Lee, Philippe Jund, Young-Kyun Kwon)
 - Quantum conductance
 - Bundling, stability, electronic structure, melting, energy storage



1995 – 2010

1D (Carbon) Nanotubes

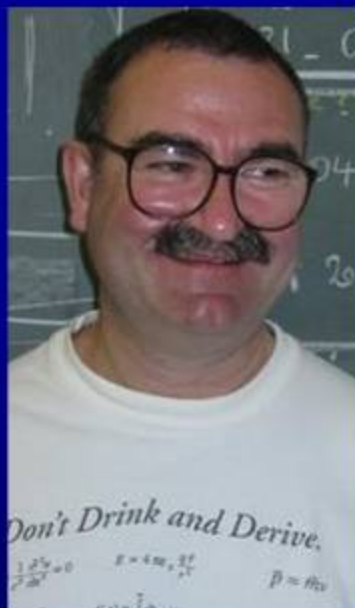
- **NTxx** conferences on the
“Science and Application of Nanotubes”



CVD catalytic growth of carbon nanotubes:
Courtesy Morinobu Endo

- **CCTNxx** satellite conferences on
“Computational Challenges and Tools for Nanotubes”





David Tomanek

Michigan State University, East Lansing, Michigan, USA

*For his services to the NT'0X conference series, and especially
for his discovery of the Tomanek effect*

Some snapshots

NT conferences started in 1999:

NT99

Marriott Hotel
East Lansing
Michigan, USA

Efficient abstract
book preparation



Hammer as Chair's
enforcement tool



Good: Record
heat conductivity of
carbon nanotubes

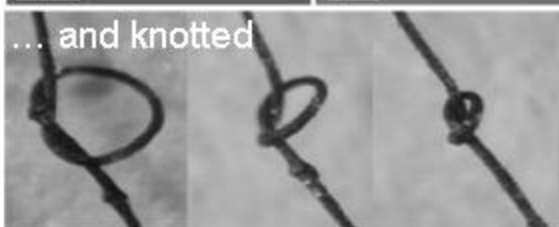


Carbon nanotubes can be
spun ...

2 μm

6 μm

... and knotted



Space
Elevator



(Another conference)

Defects in Nanocarbons:



It is Easy to Get Lost in the Nanocarbon Jungle

All this is discussed in this book:

Guide Through the
Nanocarbon Jungle

Buckyballs, nanotubes,
graphene and beyond

David Tománek



Open Access

David Tománek

**Guide through the
Nanocarbon Jungle:
Buckyballs, Nanotubes,
Graphene, and Beyond**

Get your **free e-book**
on-line: thanks to your
University library

2005 – 2020

2D: Graphene ... and Beyond

■ Graphene *monolayers*:

- Over-hyped 'cute' toy system



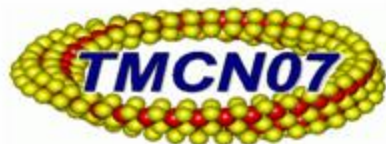
- Stable, but semi-metallic and useless for electronics
- No real applications: **dangerous for Science funding**



(Congress: "Science is just waste of money")

■ Transition Metal Dichalcogenides (TMDs):

- Used widely as lubricants
- Monolayers gave a band gap
- Nanowires, nanotubes/scrolls are unique
- Possibly useful for 2D electronics
- My group mixed in the excitement
(Teng Yang, Igor Popov, Savas Berber, Zhixian Zhou, ...)



Rathen, Germany (2007)

...

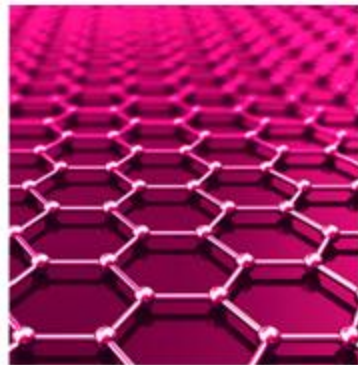
2010 – 2020

2D: Layered Systems beyond Graphene

- Group V: 2D phosphorene
 - Co-pioneered by my group (Zhen Zhu, Dan Liu, Jie Guan)
 - Quite different from graphene



- 2D Electronics Beyond Graphene
 -  New series of **Gordon Research Conferences** (GRCs)
- Two-Dimensional Materials and Devices
 - Collection of selected articles in Physical Review Applied and Physical Review Materials



Thank You



and please enjoy
Life and Science
as much as I did/still do

*I praise you, Lord,
for unlocking my lips
to sing the song
of your creation.*