

# Barak Kol

Professor of Physics  
Polak Chair in Theoretical Physics  
The Hebrew University of Jerusalem

## Curriculum Vitae

### Education

- 1986-9      BSc in a combined physics and mathematics program at Tel Aviv University. Member of the Special Program for Excellence.
- 1994-8      PhD in physics, Stanford University. Thesis "(p,q) webs in string theory" Advisor: L. Susskind.
- 1998-2000    Post-doc at Tel Aviv University<sup>1</sup>  
Host : Shimon Yankeliowicz.
- 2000-2002    Post-doc at the Institute for Advanced Study, Princeton. Nominated a Sackler fellow.  
Host : Nathan Seiberg.

### Positions

- 1989-94      Military service at an optical engineering group (head).
- Since 2002    Faculty at Racah Institute of Physics  
Hebrew University, Jerusalem, Israel (HUJI)
- 2007          Associate Professor, HUJI
- Since 2014    *Full professor*, HUJI
- 2015-8        *Head of Physics Studies*, HUJI
- Since 2018    Einstein Archives, member of Academic Committee
- Since 2019    Michael Polak chair in Theoretical Physics

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<sup>1</sup> Chosen over an offer from Princeton Un.

## Research

I perform research in theoretical physics on Fundamental Theories of Nature, mostly on High Energy Physics (Elementary particles), relativistic gravitation (General Relativity) and the Newtonian three-body problem, often concentrating on interdisciplinary problems.

Selected research papers

BK, "[Flux-based statistical prediction of three-body outcomes](#),"  
Celest. Mech. Dyn. Astron. **133**, 17 (2021) [[arXiv:2002.11496](#)]

BK and R. Shir,  
"The propagator seagull: general evaluation of a two loop diagram,"  
JHEP **1903** (2019) 083. [[arXiv:1809.05040 \[hep-th\]](#)].  
BK, "Symmetries of Feynman integrals and the Integration By Parts method,"  
[arXiv:1507.01359 \[hep-th\]](#).

BK and M. Smolkin,  
"Black hole stereotyping: Induced gravito-static polarization",  
JHEP **1202**, 1 (2012). [[arXiv:1110.3796\[hep-th\]](#)].

BK and M. Smolkin,  
"Non-Relativistic Gravitation: From Newton to Einstein and Back",  
Class.Quant.Grav. **25**, 145011 (2008). [[arXiv:0712.4116\[hep-th\]](#)].

V. Asnin et. al.,  
"High and low dimensions in the black hole negative mode",  
Class.Quant.Grav. **22**, 5527 (2007). [[arXiv:0706.1555\[hep-th\]](#)]

BK, "The phase transition between caged black holes and black strings: A review,"  
Phys. Rep. **422**, 119 (2006) [[arXiv:hep-th/0411240](#)].

BK, "Topology change in general relativity and the black-hole  
black-string transition,"  
JHEP **0510** (2005) 049 [[arXiv:hep-th/0206220](#)].

BK, "On conformal deformations,"  
JHEP **0209** (2002) 046 [[arXiv:hep-th/0205141](#)].

O. Aharony, A. Hanany and BK,  
"Webs of (p,q) 5-branes, five dimensional field theories  
and grid diagrams,"  
JHEP **01**, 002 (1998) [[arXiv:hep-th/9710116](#)].

Up to date publication list on [Google Scholar](#), [INSPIRE](#) (high energy physics database) and [NASA/ADS](#) (astrophysics database). Altogether, over 57 published papers, over 4,400 Google Scholar citations and h index 30.

## Teaching and Training

### Research students

#### Graduated

- Evgeny Sorkin, PhD 2004.
- Dan Gorbonos, PhD 2007.
- Vadim Asnin, PhD 2008.
- Nidal Haddad, MSc 2008. Faculty at Bethlehem.
- Michael Smolkin PhD 2010. Faculty at HUJI.
- Michele Levi PhD 2011. Faculty at Oxford.
- Shahar Hadar. PhD 2014. Faculty at Haifa U.
- Bernard Nabet MSc 2014.
- Ofek Birnholtz PhD 2015. Faculty at Bar-Ilan U.
- Ruth Shir, PhD 2017.
- Amit Schiller MSc 2020.
- Judy Shir MSc 2022.
- Dor Lev-Ari MSc 2023.

#### Current

- Yuval Della-Pergola, MSc student.
- Nadav Naftali, MSc student.

### Post-doc fellows

- Umpei Miyamoto 2009.
- Subhajit Mazumdar 2020.
- Yogesh Dandekar 2022.

### Courses taught

- [\*Black holes\* 77632](#).  
Self-developed course. Given 6 times (Springs 2003, 2005, 2007, 2009, 2012, 2013).
- [\*Mechanics and Special Relativity\* 77101](#).  
Given 5 times (Fall 2005-09).
- [\*Classical Field Theory\* 77641](#).  
Self-developed course. Given 4 times (Falls of 2008, 2010, 2011, 2012)
- [\*Quantum field theory B\*, Spring 2004](#).  
An advanced course to which I made a major revision, to reach more advanced topics.
- [\*Physics for mathematicians\*](#).  
Fall 2005.
- [\*Physics of Musical instruments\* 77568](#).  
Self-developed seminar. Given 3 times (Springs 2009, 2012-3).
- [\*Advanced Quantum Mechanics B\* 77801](#).  
Given twice (Springs 2010, 2011).

- [Relativity and gravitation 77909](#).  
Fall 2014.
- [Analytical Mechanics 77303](#).  
Given 6 times (Falls 2014-19)
- [Introduction to research 77532](#).  
Given 3 times (Falls 2015-17).
- [Quantum Field Theory A 77915](#).  
Given 5 times (2018-2022).
- [Advanced Quantum Theory A 77800](#).  
Fall 2022.
- [Thinking Physics](#).  
Self-developed informal course, Fall 2023.

### **Talks, outreach and media appearances**

Presented numerous professional talks at conferences, colloquia and seminars. Prepared several outreach talks and articles. Numerous media appearances on TV, radio and general newspapers.

### **Research grants**

Has one 12 research grants (including 8 with up to 3 PIs from Israel Science Foundation, Bi-national Science Foundation, DIP, Einstein Foundation Berlin, I-CORE and Vatat (PBC)).

### **Organization**

- 2016-23 The Bekenstien Lectures on Fundamental Physics, organizer.
- 2017 - Strings 2017 – international conference, Tel-Aviv, 26-30 June 2017, co-organizer.
- 2012 - Forty years of black hole thermodynamics – international workshop, Jerusalem, 3-6.9.2012, head of organizing committee.
- 2007 - Einstein' gravity in higher dimensions – international workshop, Jerusalem 18-23.2.2007, organizer.
- Organized for several years the Israeli Joint High Energy Seminar (Neve-Shalom), co-organized the HU Physics colloquium during several years, co-organized several times the Jerusalem (international) winter school, organized several HE sessions of Israel Physics Society (IPS) meetings, and more.

### **Awards**

- Excellent teacher: 3 times (2015-6, 2014-5, 2009-10).
- 2008 Fifth award in the Gravity Research Foundation essay contest.
- 2003 BSF Bergmann award.
- 1998 Stanford Kirkpatrick teaching award.
- 1986-9 Member of Special Program for Excellence during undergraduate studies at Tel Aviv U. On the dean's list for all 3 years.

**Family and personal data**

Birth Aug 1968, Cleveland, Ohio, USA.

Citizenship Israel, US

Family return to Israel: 1970

Grew up in Kfar-Saba, Israel

Parents Sara and Yoram

Siblings Eldest of five. Brothers: Boaz, Amos, Amir and Yohai.

Family status Married to Dorit, father to Inbal (2001), Neta (2004) and Saar (2007).

**Contact information**

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