

# Idse Heemskerk

## Postdoctoral positions

- 2015- now **Branco Weiss Fellow, Quantitative Stem Cell Biology**  
*Warmflash lab, Rice University, Houston*  
Embryonic stem cells as an experimental model for human development.
- 2012-2015 **Moore Fellow, Theoretical Biological Physics**  
*Kavli Institute for Theoretical Physics, Santa Barbara*  
Computational tools for handling large data, theory of organ growth and patterning.

## Education

- 2012 **Ph.D. in Theoretical Physics, University of California, Santa Barbara**  
String theory. Advisor: Joseph Polchinski.
- 2007 **M.S. in Theoretical Physics, cum laude, Universiteit van Amsterdam**  
Black hole quantum mechanics. Partly at U. de Barcelona. Advisors: Erik Verlinde, Jorge Russo.
- 2007 **B.S. in Computer Science, cum laude, Universiteit van Amsterdam**
- 2005 **B.S. in Physics, Universiteit van Amsterdam**

## Honors

- 2016-2021 **Branco Weiss Fellowship, Society in Science (\$500k)**  
\$100k/year for 5 years, transferable to recipient's independent lab.
- 2010-2011 **Luce Environmental Science to Solutions Fellowship, UC Santa Barbara (\$6k)**  
Interdisciplinary collaboration on the framing of environmental science in print media.
- 2008 **Wheelon Award, UC Santa Barbara (\$2k)**  
For outstanding academic achievement in advanced graduate physics classes.

## Other experience

- 2014-2015 **Visiting Scientist, Sprinzak lab, Tel Aviv University, Israel**  
Two summers visiting the Sprinzak lab in a collaboration on synthetic planar cell polarity.

## Publications

### **Morphogen dynamics control patterning in a stem cell model of the human embryo.**

[Heemskerk I](#), Burt K, Miller M, Chhabra S, Guerra C, Warmflash A.  
*bioRxiv 202366*

### **A synthetic planar cell polarity system reveals localized feedback on Fat4-Ds1 complexes.**

Loza O\*, [Heemskerk I\\*](#), Gordon-Bar N, Amir-Zilberstein L, Jung Y, Sprinzak D.  
*Elife 2017*

### **Active tension network model suggests an exotic mechanical state realized in epithelial tissues.**

Noll N, Mani M, [Heemskerk I](#), Streichan S, Shraiman B.  
*Nature Physics 2017, arXiv:1508.00623*

### **Morphogen and community effects determine cell fates in response to BMP4 signaling in human embryonic stem cells.**

Nemashkalo A, Ruzo A, [Heemskerk I](#), Warmflash A.  
*Development 2017, bioRxiv 125989*

### **Pluripotent stem cells as a model for embryonic patterning: From signaling dynamics to spatial organization in a dish.**

[Heemskerk I](#), Warmflash A.  
*Developmental Dynamics 2016*

**Differential growth triggers mechanical feedback that elevates Hippo signaling.**

Pan Y, Heemskerk I, Ibar C, Shraiman B, Irvine K.  
Proceedings of the National Academy of Sciences 2016

**Tissue cartography: compressing bio-image data by dimensional reduction.**

Heemskerk I\*, Streichan SJ\*.  
Nature Methods 2015

**Dynamic clonal analysis based on chronic in vivo imaging allows multiscale quantification of growth in the *Drosophila* wing disc.**

Heemskerk I, Lecuit T, LeGoff L.  
Development 2014

**Bulk and transhorizon measurements in AdS/CFT.**

Heemskerk I, Marolf D, Polchinski J, Sully J.  
Journal of High Energy Physics 2012

**Construction of bulk fields with gauge redundancy.**

Heemskerk I.  
Journal of High Energy Physics 2012

**Holographic and Wilsonian renormalization groups.**

Heemskerk I, Polchinski J.  
Journal of High Energy Physics 2011

**More Holography from Conformal Field Theory.**

Heemskerk I, and Sully J.  
Journal of High Energy Physics 2010

**Holography from conformal field theory.**

Heemskerk I, Penedones J, Polchinski J, Sully J.  
Journal of High Energy Physics 2009

---

## Mentoring

- 2016- now **Lab technicians**, *Rice University*  
Recruited and trained 2 lab technicians. Supervising 1 full time and 2 part time lab technicians.
- 2016- now **Undergraduate students**, *Rice University*  
Mentored 5 undergrads with different majors, projects from cell biology to engineering hardware.
- 2013-2016 **Graduate students**, *Tel Aviv University & Rutgers University*  
In collaborations, trained biology grad students in taking and analyzing quantitative data.

---

## Teaching

- 2017 **Guest lecturer, Biology and the Future of Medicine**, *Rice University*  
Senior undergrad class, stem cell models of the human embryo and embryonic research policy.
- 2016-2017 **Guest lecturer, Computation in Biology**, *Rice University*  
Graduate course at Rice (2x), lectures and homework on segmentation and handling huge image data.
- 2016 **Teacher, Santa Barbara Advanced Summer School in Quantitative Biology**  
Designed and taught cell culture boot camp and 2 week intensive course on stem cell patterning.
- 2007-2011 **Teaching Assistant, Physics**, *UC Santa Barbara*  
12 quarters total, courses ranging from graduate “String Theory” to “Intro Physics Lab”.

---

## Science outreach

Involved in science outreach throughout my career. Highlights:

- 2017 **Developmental biology, stem cells, and physics**, *Verbum Dei High, Los Angeles*  
Lecture for 10<sup>th</sup> grade honors biology students.
- 2014 **Quantitative biology of the fly embryo**, *Laguna Blanca High, Santa Barbara*  
Lecture for AP bio seniors.
- 2014 **Speaker at Career Fair**, *La Cumbre Junior High, Santa Barbara*

---

## Selected talks

- 2018 **ESHRE symposium “In Vitro Modeling: From Embryo to Gametes”, Bilbao, Spain, invited talk**
- 2017 **Cold Spring Harbor Laboratory, Stem Cell Biology Meeting, contributed talk**  
*Morphogen dynamics matter— hESCs reveal role for changing ligand levels in directing differentiation.*
- 2017 **Hilde Mangold Postdoctoral Symposium, SDB Annual Meeting, selected talk**  
*Nodal is not Bicoid: hESCs reveal role of morphogen dynamics in embryonic patterning.*
- 2016 **Kavli Institute for Theoretical Physics, morpho16 conference, contributed talk**  
*Morphogen dynamics and germ layer specification in a dish.*
- 2012 **University of Michigan, invited seminar**  
*The Incredible Bulk.*
- 2011 **Princeton University, invited seminar**  
*Prying the CFT from the AdS boundary.*
- 2011 **MIT / Harvard, invited seminar**  
*Prying the CFT from the AdS boundary.*
- 2010 **École Normale Supérieure Paris, invited seminar**  
*Wilsonian Holographic Renormalization.*