

# Charting the strongly coupled Landscape

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Max Wiesner

DESY Fellows Meeting 2024  
November 18, 2024

# About me

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- Born: March 2nd, 1995:

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*[Submitted on 2 Mar 1995 ([v1](#)), last revised 3 Mar 1995 (this version, v2)]*

## **Observation of Top Quark Production in $P\bar{P}$ Collisions**

The [CDF Collaboration](#)

*[Submitted on 20 Mar 1995 ([v1](#)), last revised 24 Mar 1995 (this version, v2)]*

## **String Theory Dynamics In Various Dimensions**

[Edward Witten](#)

# About me

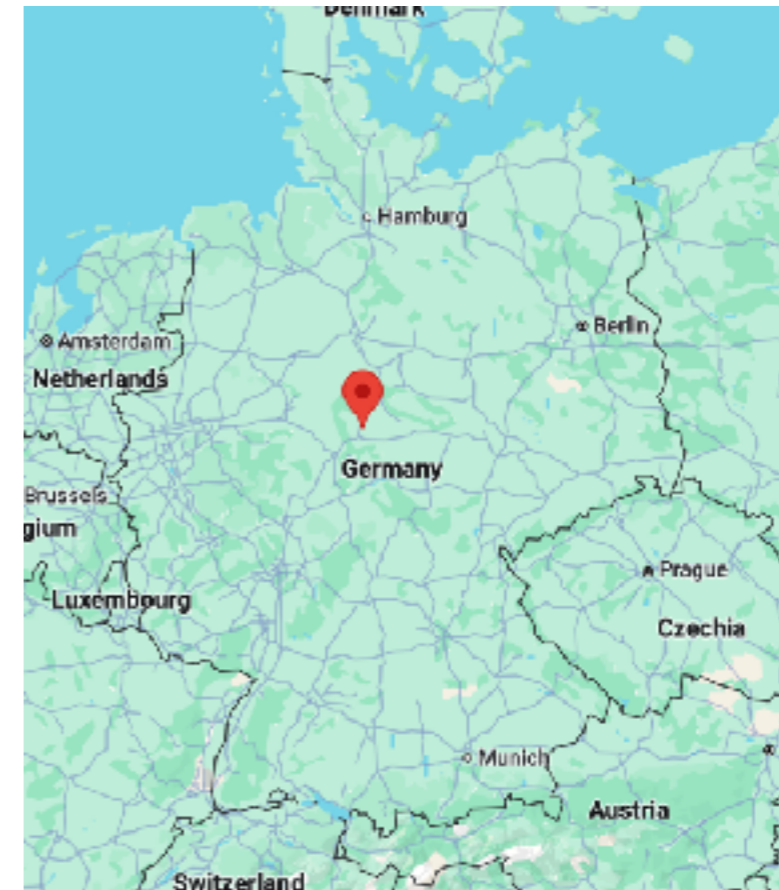
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- Born: March 2nd, 1995 in Soest (Nordrhein-Westfalen)



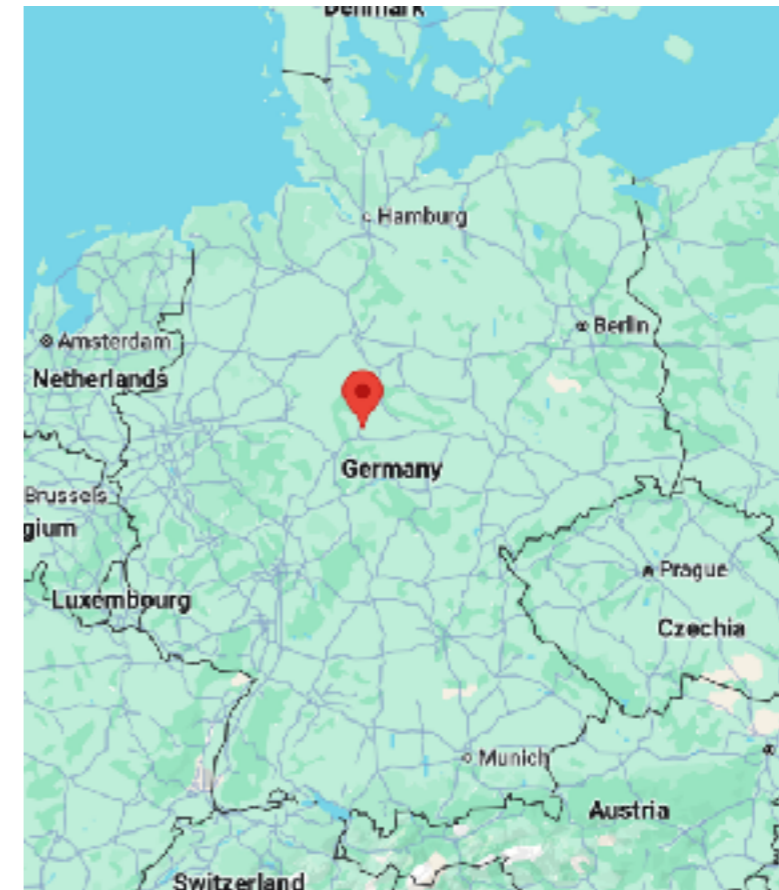
# From Soest to Göttingen:

- From Soest, I went to Göttingen for my undergrad:



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- From Soest, I went to Göttingen for my undergrad:



- Nowadays, there is not much going on in Göttingen, just one of the annoying stops of the train between Hamburg and Munich ...



# From Göttingen to Bonn:

- For my master's, I then went to Bonn ...



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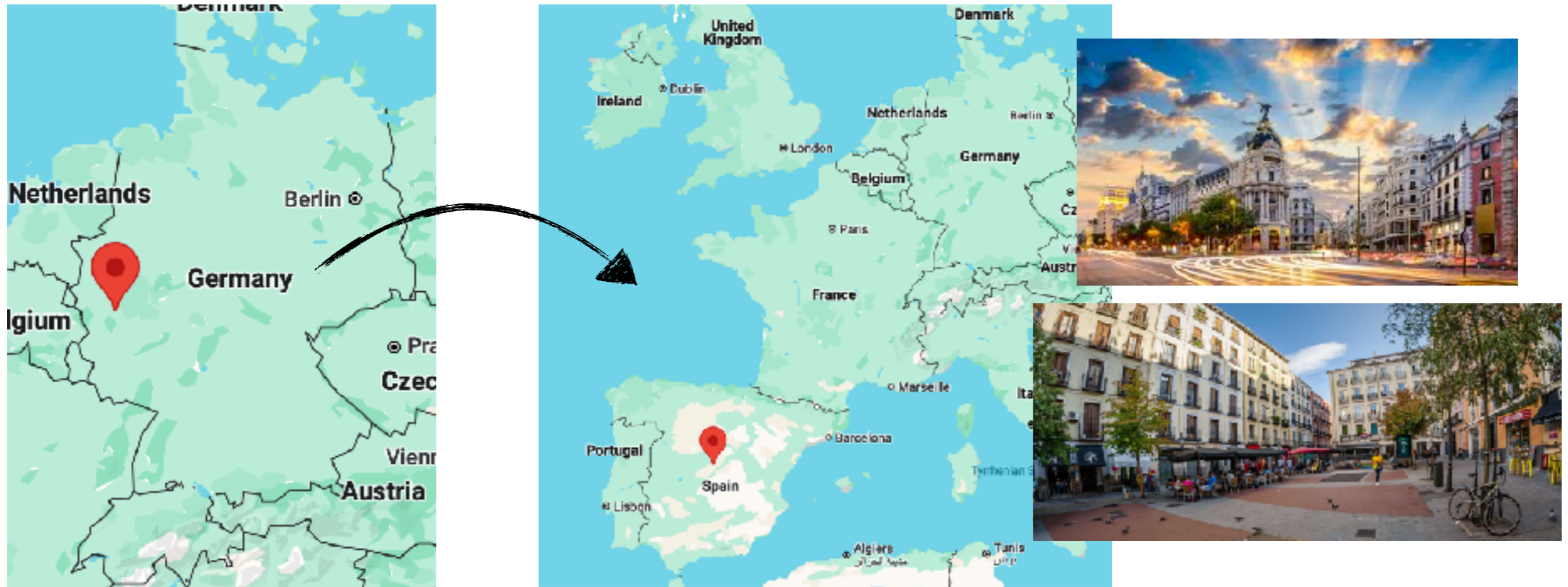
- Nowadays, there is not much going on in Bonn, just a bunch of civil servants that the federal government left there when they moved to Berlin.

(... and a lot of very good mathematicians)



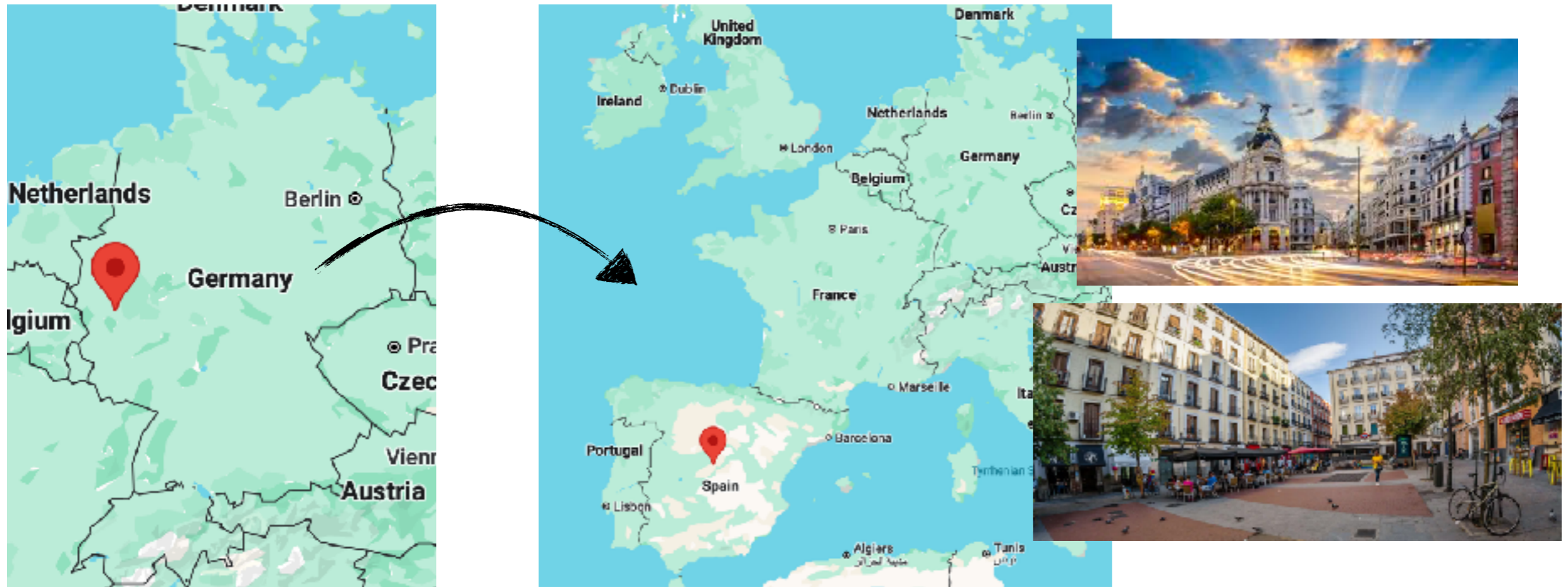
# From Bonn to Madrid:

- For my PhD, I then chose a slightly more lively place and in 2018 went to Madrid:



# From Bonn to Madrid:

- For my PhD, I then chose a slightly more lively place and in 2018 went to Madrid:



- I did my PhD at IFT UAM-CSIC under the supervision of Fernando Marchesano and graduated in 2021.



# From Madrid to Boston:

- In September 2021 I moved to Boston/Cambridge/Somerville Massachusetts for my 1st Postdoc:



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- ▶ For 3 years I was postdoc at the Harvard Physics Department and the Harvard Center for Mathematical Sciences and Applications (CMSA) working with Cumrun Vafa.

# From Madrid to Boston:

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- ▶ For 3 years I was postdoc at the Harvard Physics Department and the Harvard Center for Mathematical Sciences and Applications (CMSA) working with Cumrun Vafa.
- ▶ In September 2024, I exchanged my office view:



# From Madrid to Boston and back to Germany

- ▶ In September 2021 I moved to Boston/Cambridge/Somerville Massachusetts for my 1st Postdoc



- ▶ For 3 years I was postdoc at the Harvard Physics Department and the Harvard Center for Mathematical Sciences and Applications (CMSA) working with Cumrun Vafa.
- ▶ .... for this view:

*though overall I would say that I am in a better place right now :)*



# “So what are *you* working on?”

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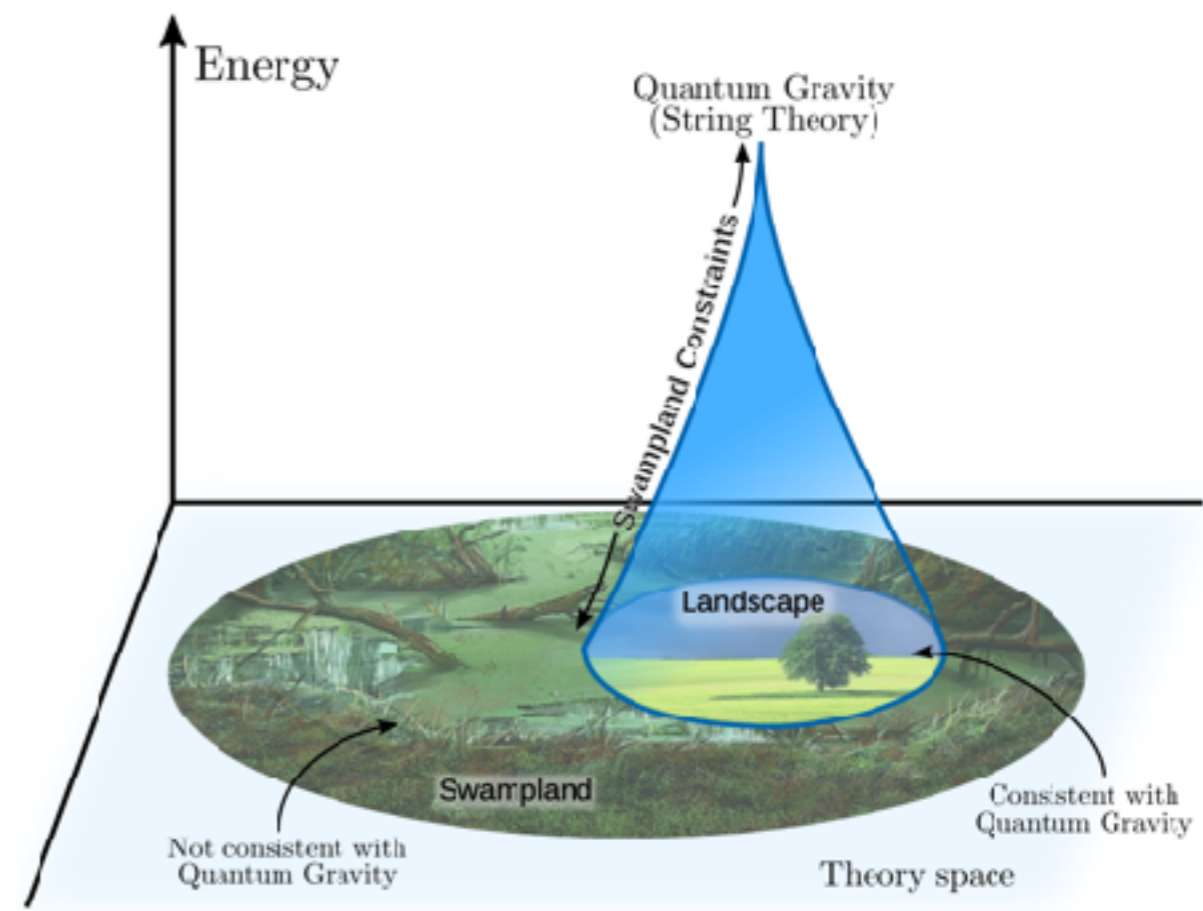
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- My research focuses on quantum gravity and string theory.
- Which kind of low-energy effective theories are compatible with quantum gravity?
- One hint: What theories can we get from string theory?

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- **Problem:** string theory best understood if we have weak string coupling and/or a lot of supersymmetry  
→ many quantum effects vanish...



Picture shamelessly stolen from [van Beest et al '21]

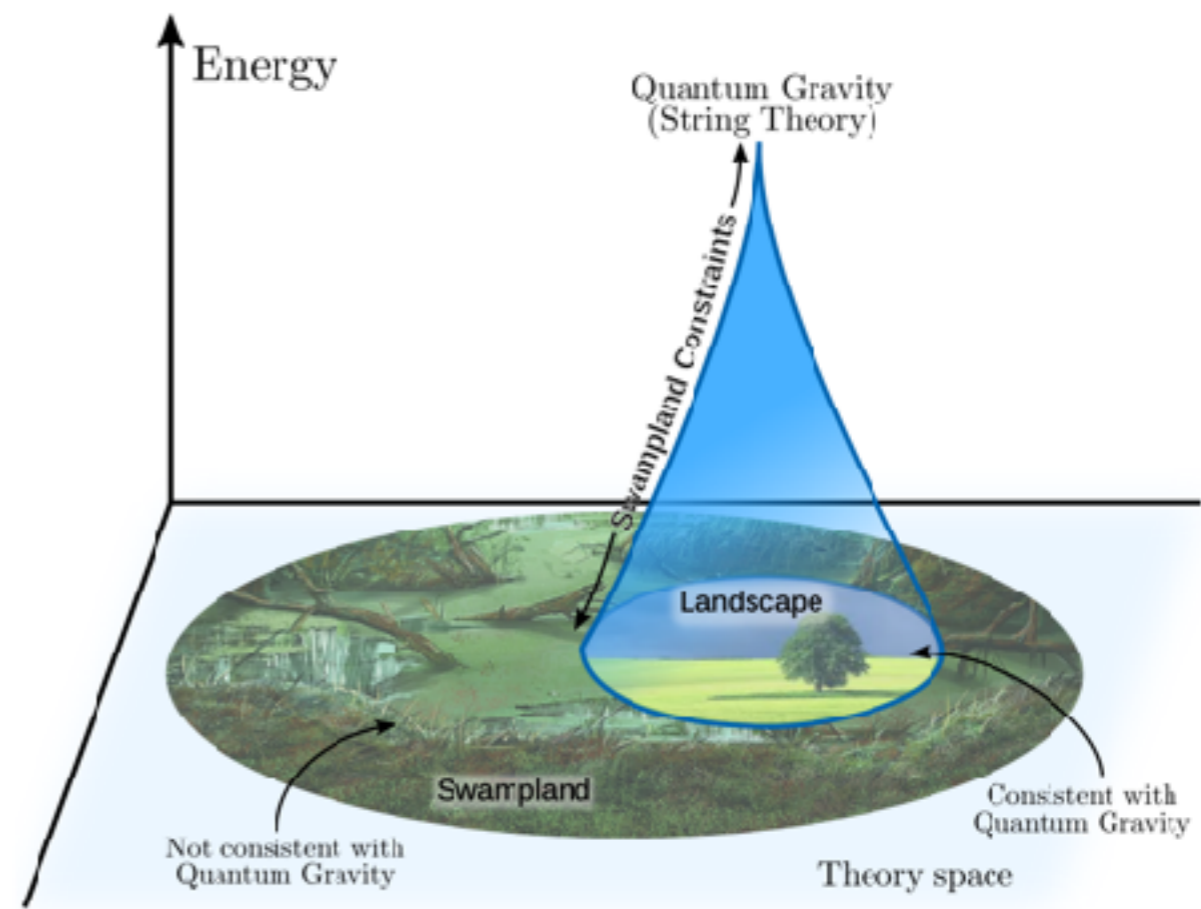
# “So what are *you* working on?”

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- **Problem:** string theory best understood if we have weak string coupling and/or a lot of supersymmetry

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- **One may ask:** *What do we learn about quantum gravity if we look at theories where quantum gravitational theories absent?*



Picture shamelessly stolen from [van Beest et al '21]

- **My question:** What is the role of strong coupling and quantum corrections in theories of gravity with minimal supersymmetry, and does the Swampland/Landscape look very different here?

# “So what are *you* working on?”

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**Timo Jargon**

**four-dimensional theories**

**supersymmetry**

**decompactification**

**weakly coupled**

**perturbative**

**gauge threshold**

**renormalisation**

**infinite distance limits**

**sublattice of states**

**tower of excitations**

**emergent heterotic string**



slide taken from this [YouTube video](#)

# “So what are *you* working on?”

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**Timo Jargon**  
**+ Max**  
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slide taken from this [YouTube video](#)

# “So what are *you* working on?”

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**Timo Jargon**  
*+ Max*

**four-dimensional theories**  
**supersymmetry**

**Swampland vs. Landscape**

**Moduli spaces**

**Instanton corrections/Non-perturbative effects**

**Tensionless Strings**

**Heterotic Strings, M-/F-theory**

**Duality**



# My interests:

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- In my free time I like to explore Swamplands ...

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[Santa Rosa NP, Guanacaste, Costa Rica](#)

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Grand Teton NP, Wyoming, USA

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Santa Rosa NP, Guanacaste, Costa Rica



Grand Teton NP, Wyoming, USA



Somewhere in Massachusetts,  
w/ Matilda Delgado

(talking in the string seminar next Monday!!!)

# My interests:

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- ... and Landscapes:

# My interests:

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Bahia de los Pirates, Guanacaste, Costa Rica

# My interests:

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- ... and Landscapes:



Bahia de los Pirates, Guanacaste, Costa Rica



Some Fjord, Norway

# My interests:

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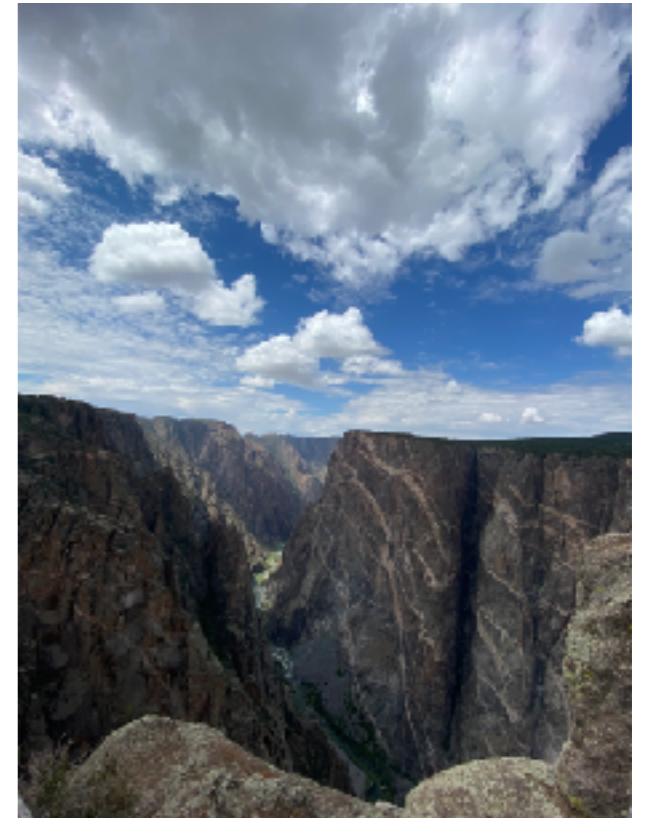
- ... and Landscapes:



Bahia de los Pirates, Guanacaste, Costa Rica



Some Fjord, Norway



Black Canyon of the Gunnison,  
Colorado, USA

# My interests:

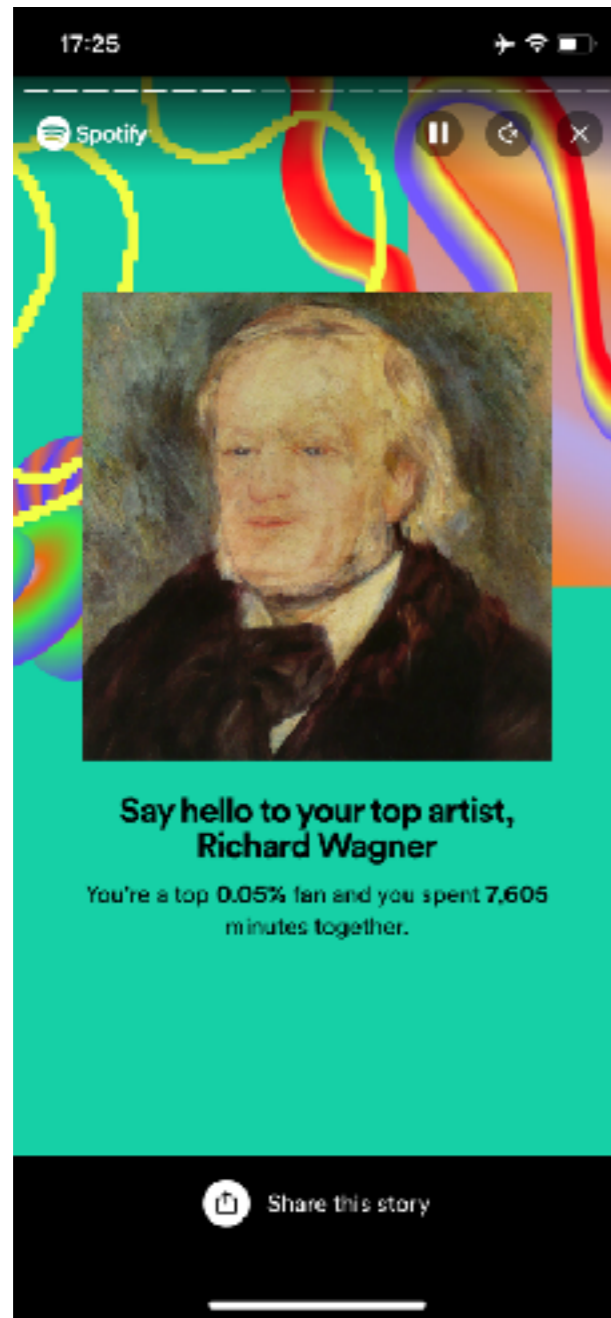
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- Listening to classical music:

# My interests:

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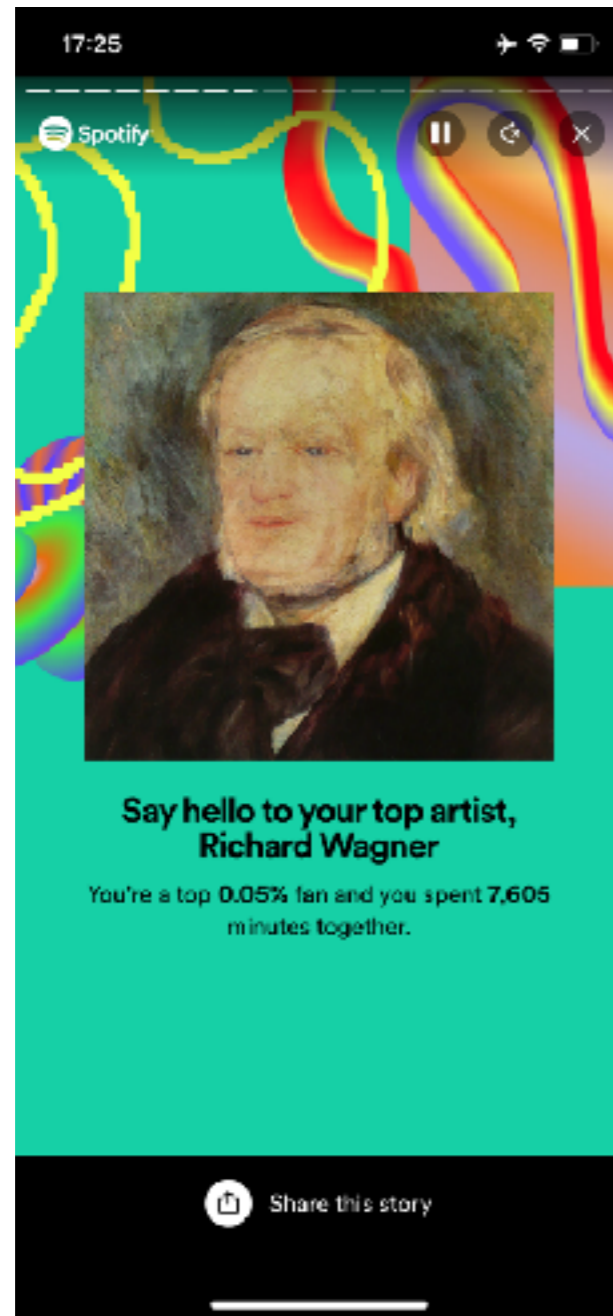
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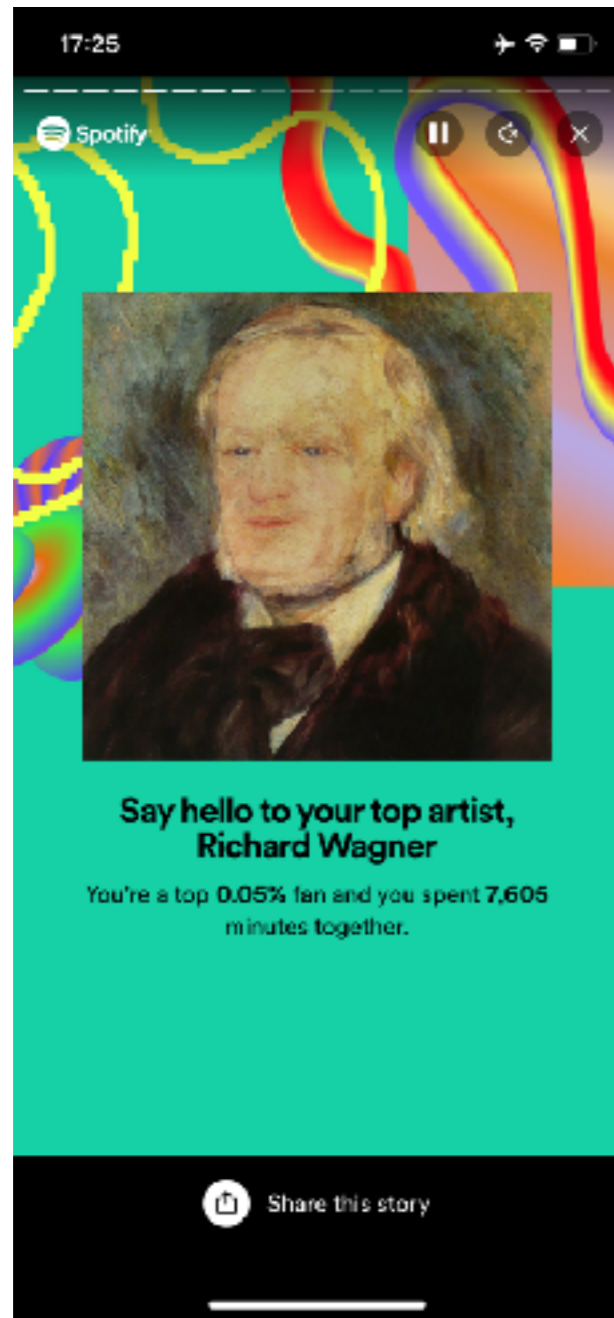


- Playing Piano and Saxophone
- Reading
- Talking about Politics

# My interests:

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- Listening to classical music:



- Playing Piano and Saxophone
- Reading
- ~~Talking about Politics~~

# Contact

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2a office: 612 (?)
- ▶ Email: [max.wiesner@desy.de](mailto:max.wiesner@desy.de)

**Thank you!!**