
S'Cool LAB
IR Cloud Chamber Workshops
20/05/2016
There is always a way to do it better... find it!
If you can't explain it simply, you don't understand it well enc

What is S’Cool LAB?

Who is S’Cool LAB?

What do we offer?

S‘Cool LAB Days for high-school students (16 – 19 y)

WELCOME TO S‘COOL LAB DAY
8:45 Meet us at the CERN Reception

VISIT TO THE SYNCHROCYCLOTRON
9:15 CERN‘s first particle accelerator

VISIT TO THE ATLAS VISITOR CENTER
10:00 See real physicist working at the largest LHC detector

S‘COOL LAB EXPERIMENT 1
11:30 Get hands-on!

LUNCH BREAK IN THE CERN RESTAURANT N°1
13:00 Time for a group picture in front of an LHC dipole magnet

S‘COOL LAB EXPERIMENTS 2 & 3 + Q&A
14:15 Get hands-on + time for your questions

GOODBYE
17:00 Time for souvenirs or a visit to the Microcosm exhibition

Participants 2015: 430 students

Cloud Chamber Workshops for teacher and student groups

Participants 2015: 2400 students and >1000 teachers

What do we offer?

S'Cool LAB Workshop Schedule

Time slot	Mo	Tu	We	Th	Fr
8:30-9:00					
9:00-13:00	Cloud Chamber slot - students	Cloud Chamber slot - students	S'Cool LAB day	Cloud Chamber slot - students	S'Cool LAB day
13:00-14:00					
14:00-17:15	Cloud Chamber slot - teachers	Cloud Chamber slot - teacher		Cloud Chamber slot - students	
17:15-20:00			S'Cool LAB training		S'Cool LAB training

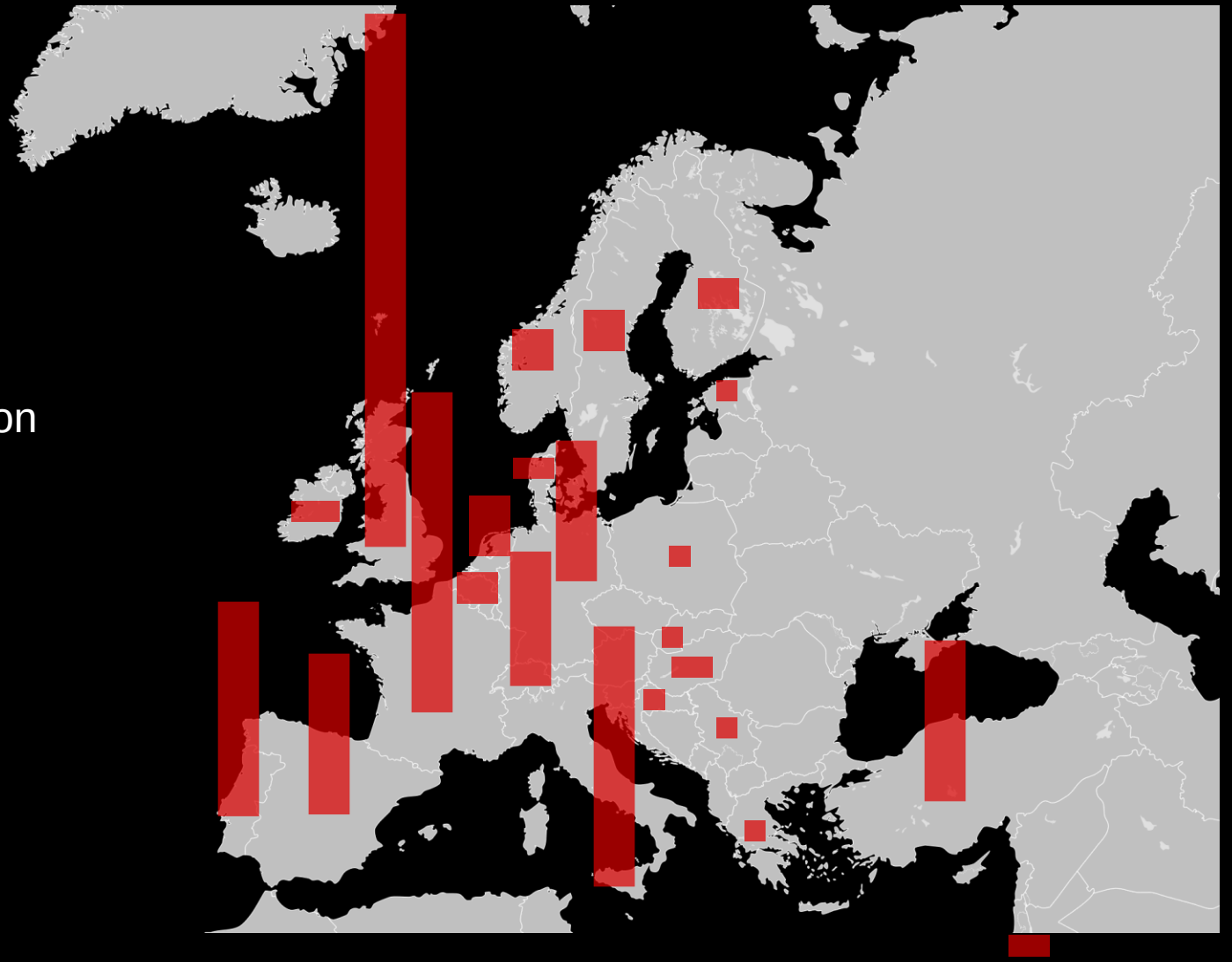
Explanation:	
Cloud chambers slots - students	Cloud Chamber Slot managed by S'Cool LAB team (Student groups)
Cloud chamber slots - teachers	Cloud Chamber Slot managed by CERN Teacher Programme Coordinator
S'Cool LAB Days	Slot managed by S'Cool LAB team (Part of full-day programme)
For all requests:	Please contact scool.lab@cern.ch

Applications for S'Cool LAB days 2015/16

- 1 Application

Applications by teachers via http://cern.ch/s-cool-lab

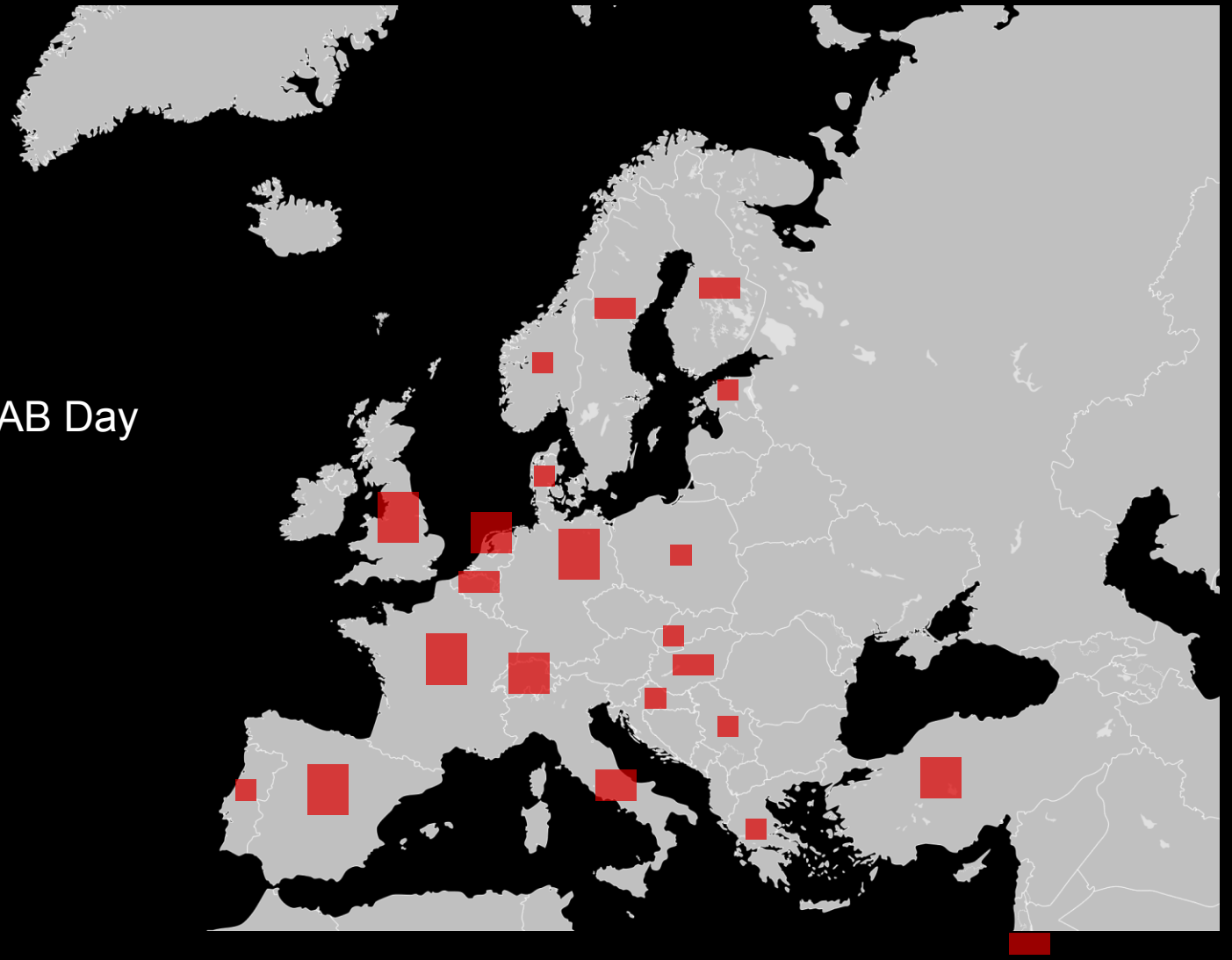
Applications for S'Cool LAB days 2015/16



- 1 Application
- Brazil
- US
- Singapore

So far: 241 applications for 51 S'Cool LAB days

S’Cool LAB days 2015/16



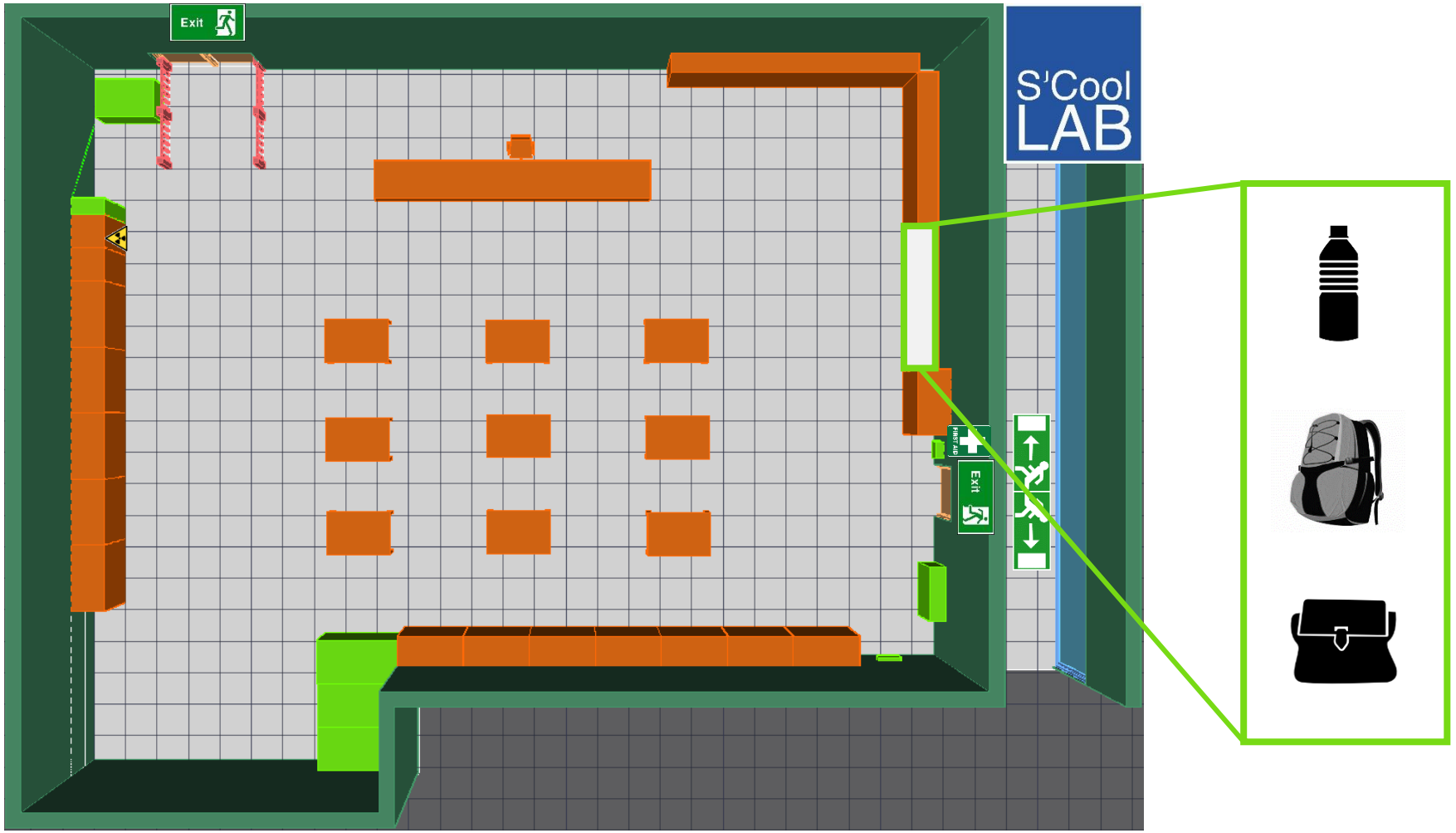
- 1 S’Cool LAB Day
- US

So far: 241 applications
for 51 S’Cool LAB days

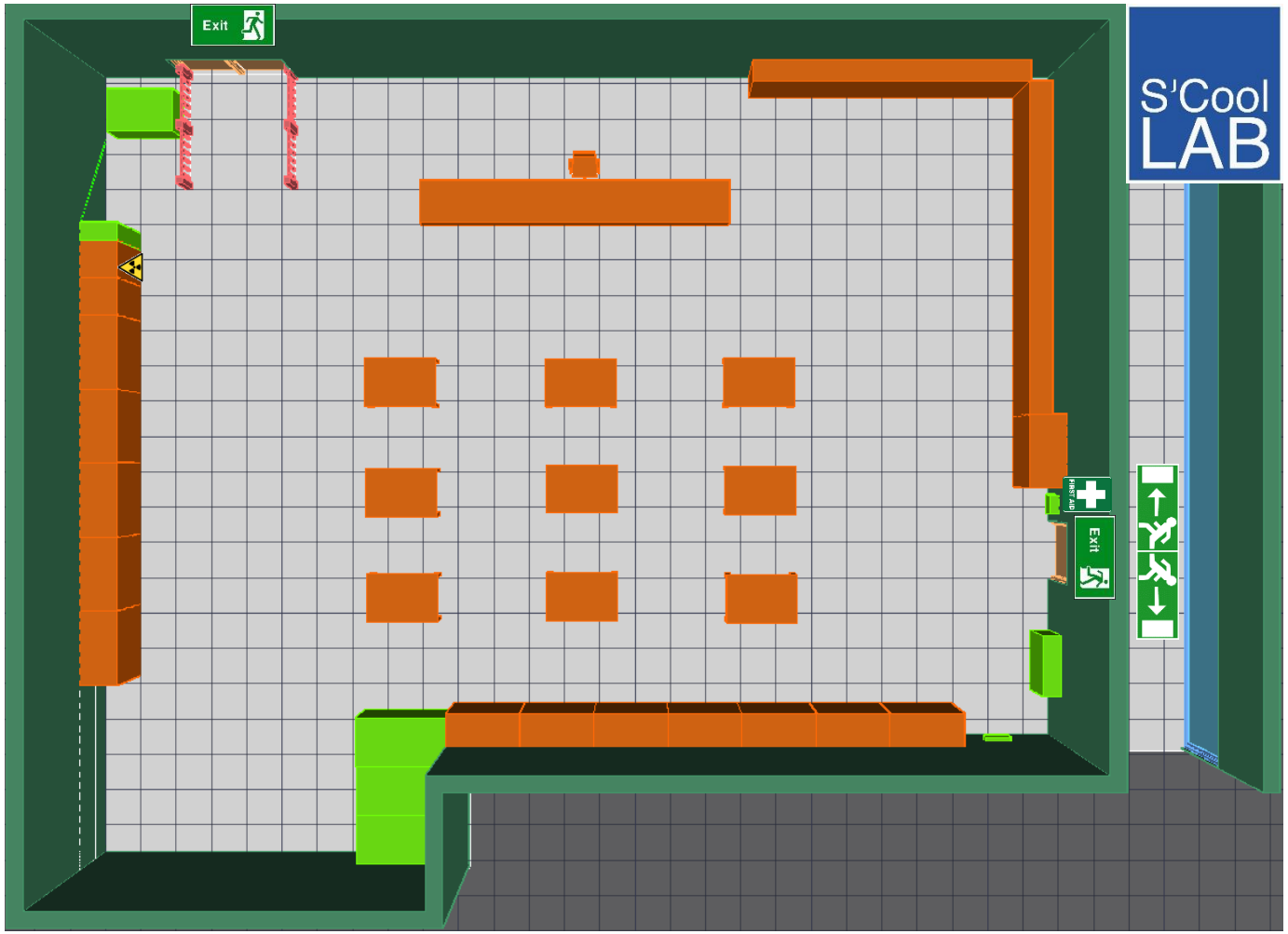
Time to get hands-on!

Rules in S‘Cool LAB

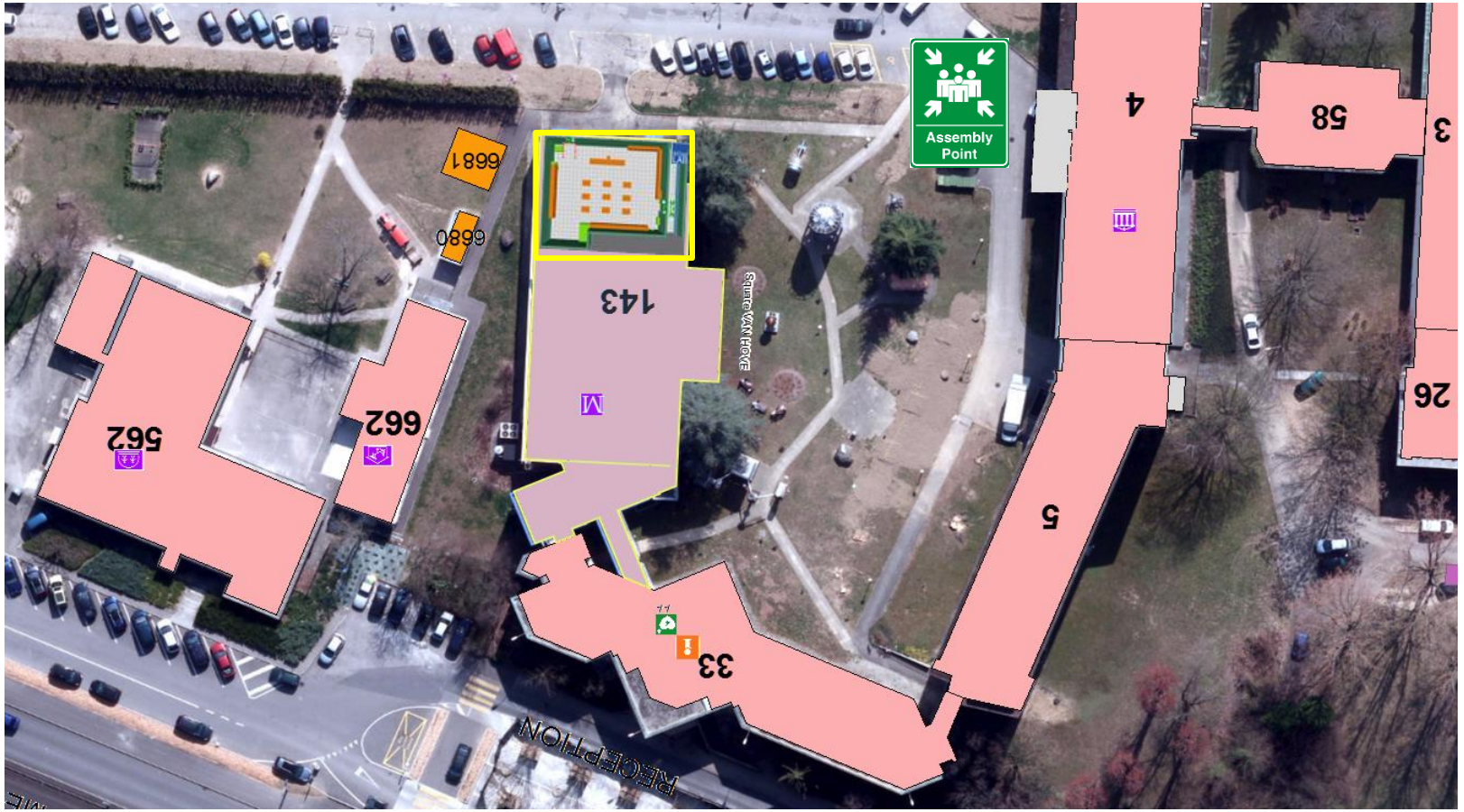
Bags



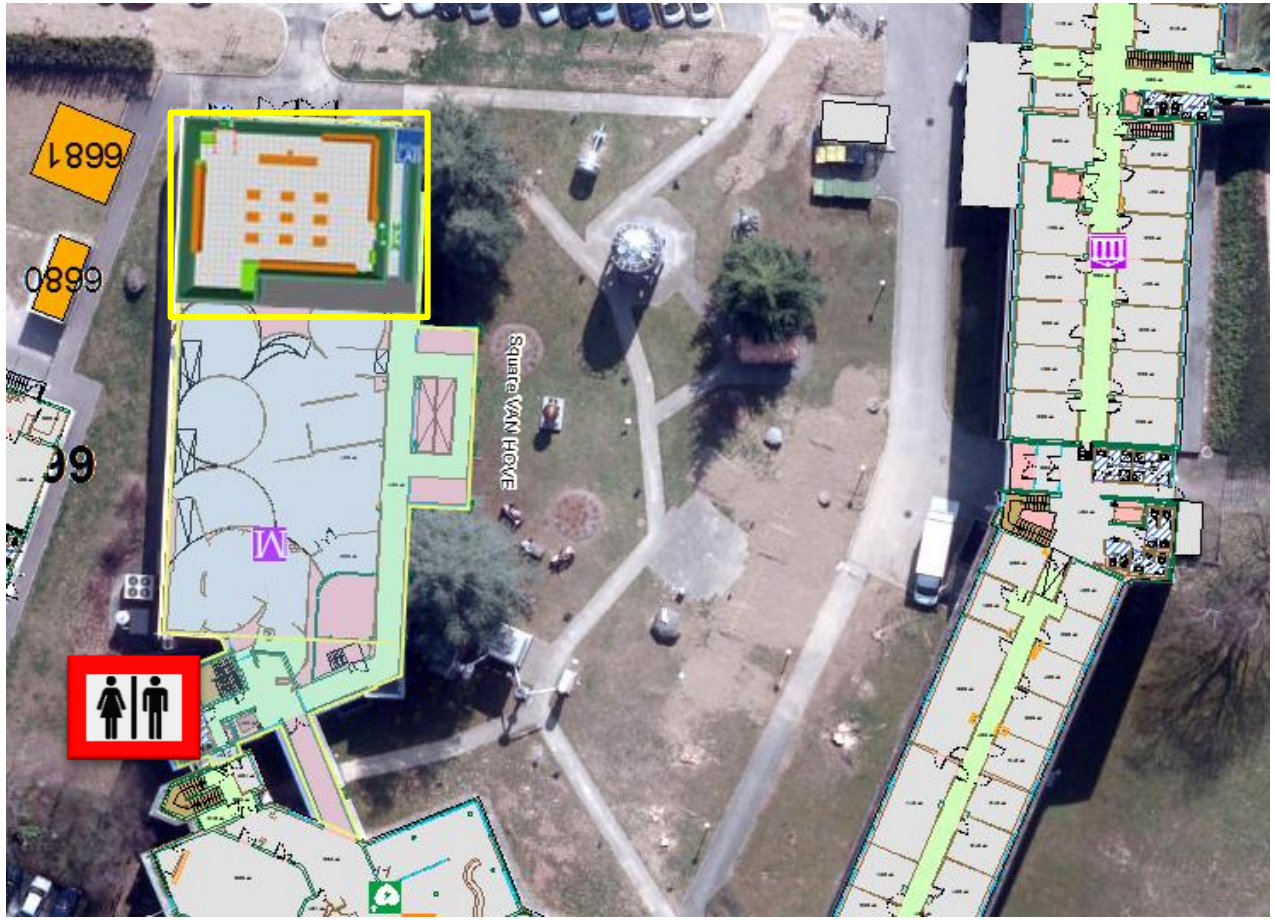
Emergency exits



Assembly point



Rest rooms



Cloud Chamber Workshop

Outline

- History
- Step by step tutorial
- Build your own particle detector
- Tidying up
- Discussion and explanations

History

History

Charles T. R. Wilson (1869 - 1959)

This Scottish physicist perfected the first (expansion) cloud chamber in 1911 and received the Nobel Prize in 1927.

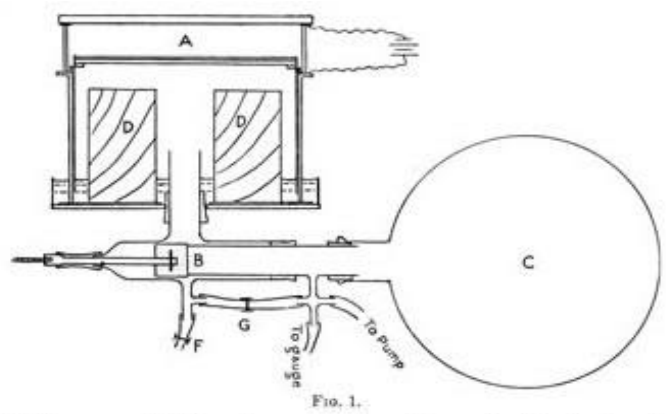


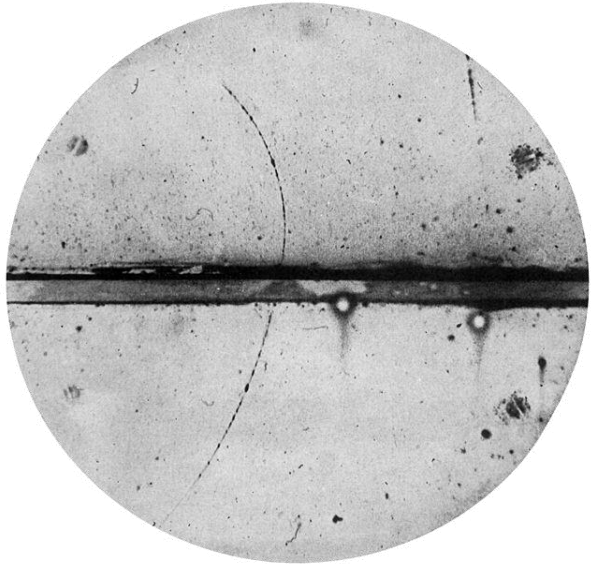
Fig. 1.

A diagram of Wilson's apparatus. The cylindrical cloud chamber ('A') is 16.5cm across by 3.4cm deep.

C. T. R. WILSON: On an Expansion Apparatus for Making Visible the Tracks of Ionising Particles in Gases and Some Results Obtained by Its Use. Proc. R. Soc. Lond. A. 1912 87 277-292 DOI:10.1098/rspa.1912.0081

Carl Anderson (1905 - 1991)

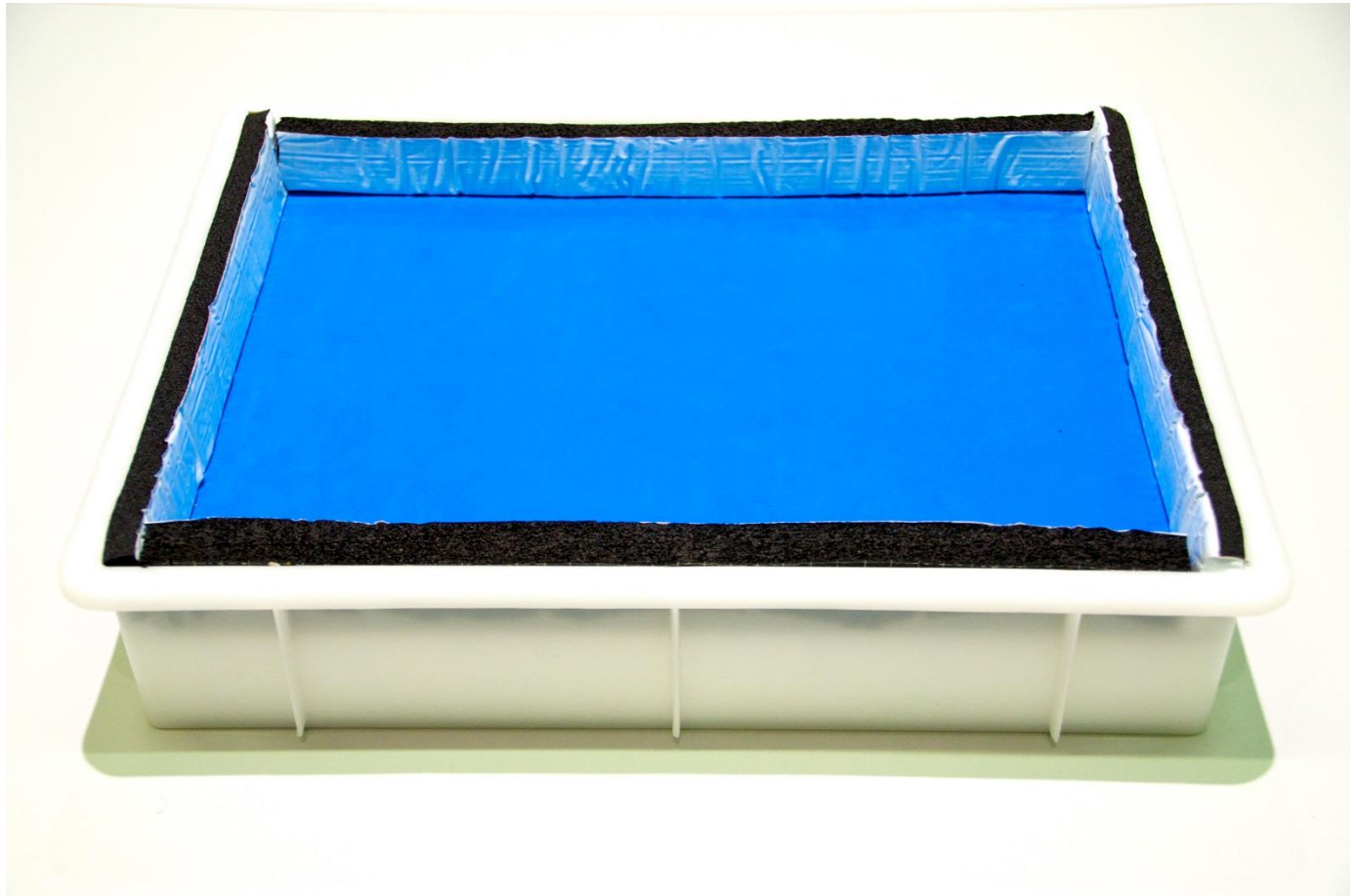
This physicist discovered the positron in 1932 and the muon in 1936 using a cloud chamber. He received the Nobel Prize in 1936.



Carl D. Anderson (1905–1991) - Anderson, Carl D. (1933). "The Positive Electron". Physical Review 43 (6): 491–494. DOI:10.1103/PhysRev.43.491.

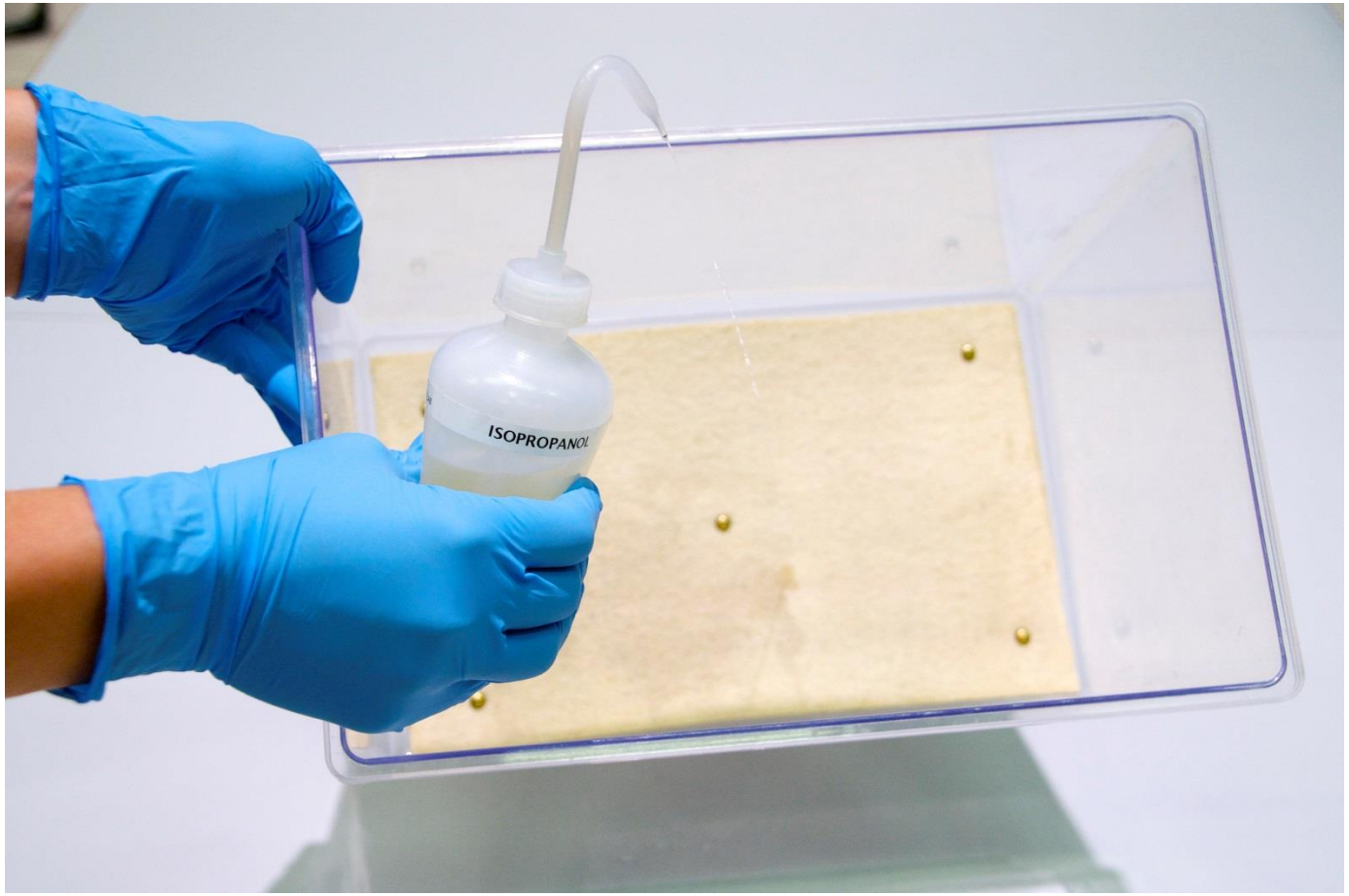
Step by step tutorial

Build your cloud chamber - step by step




BE
CAREFUL


ISOPROPANOL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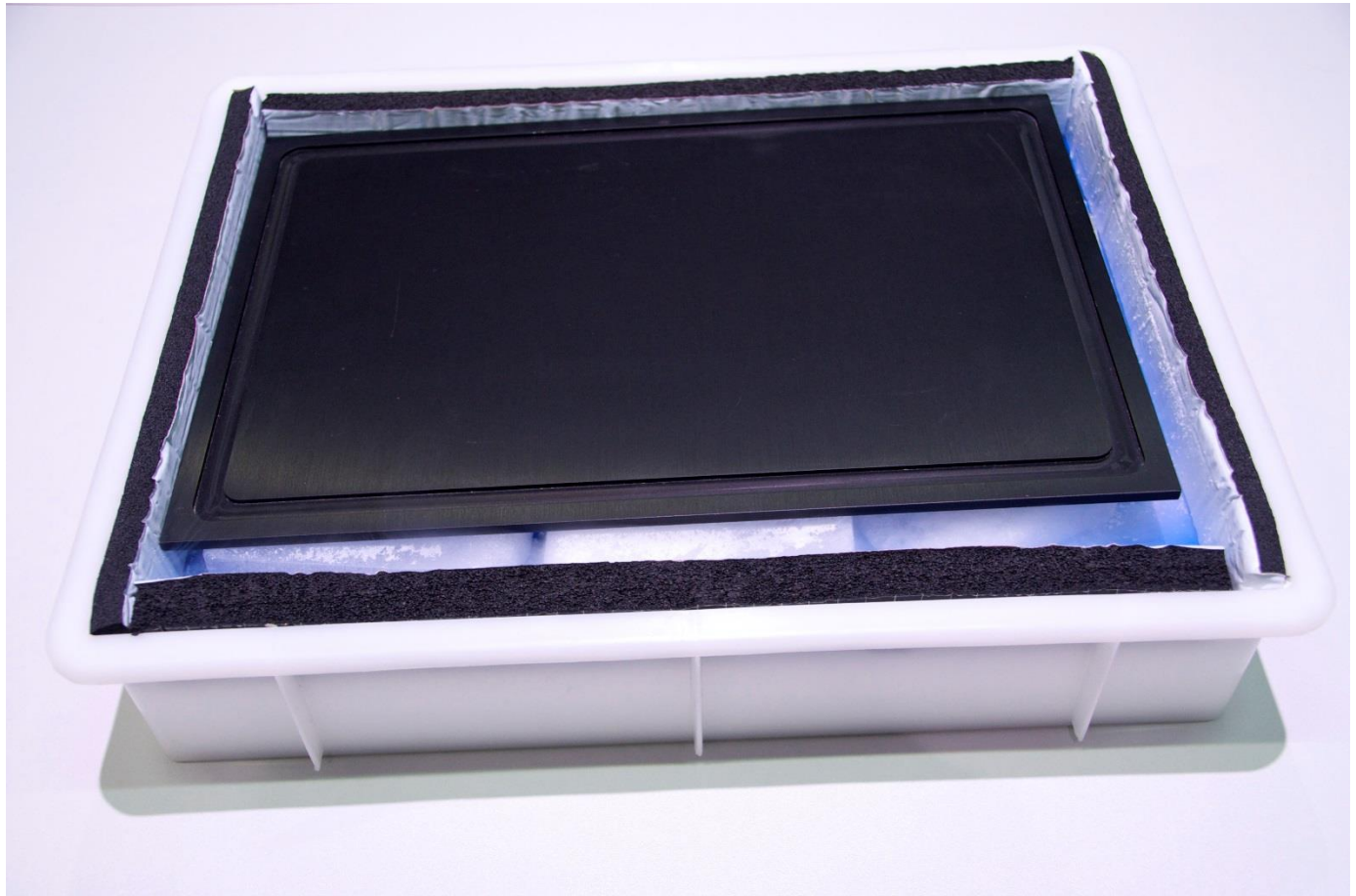
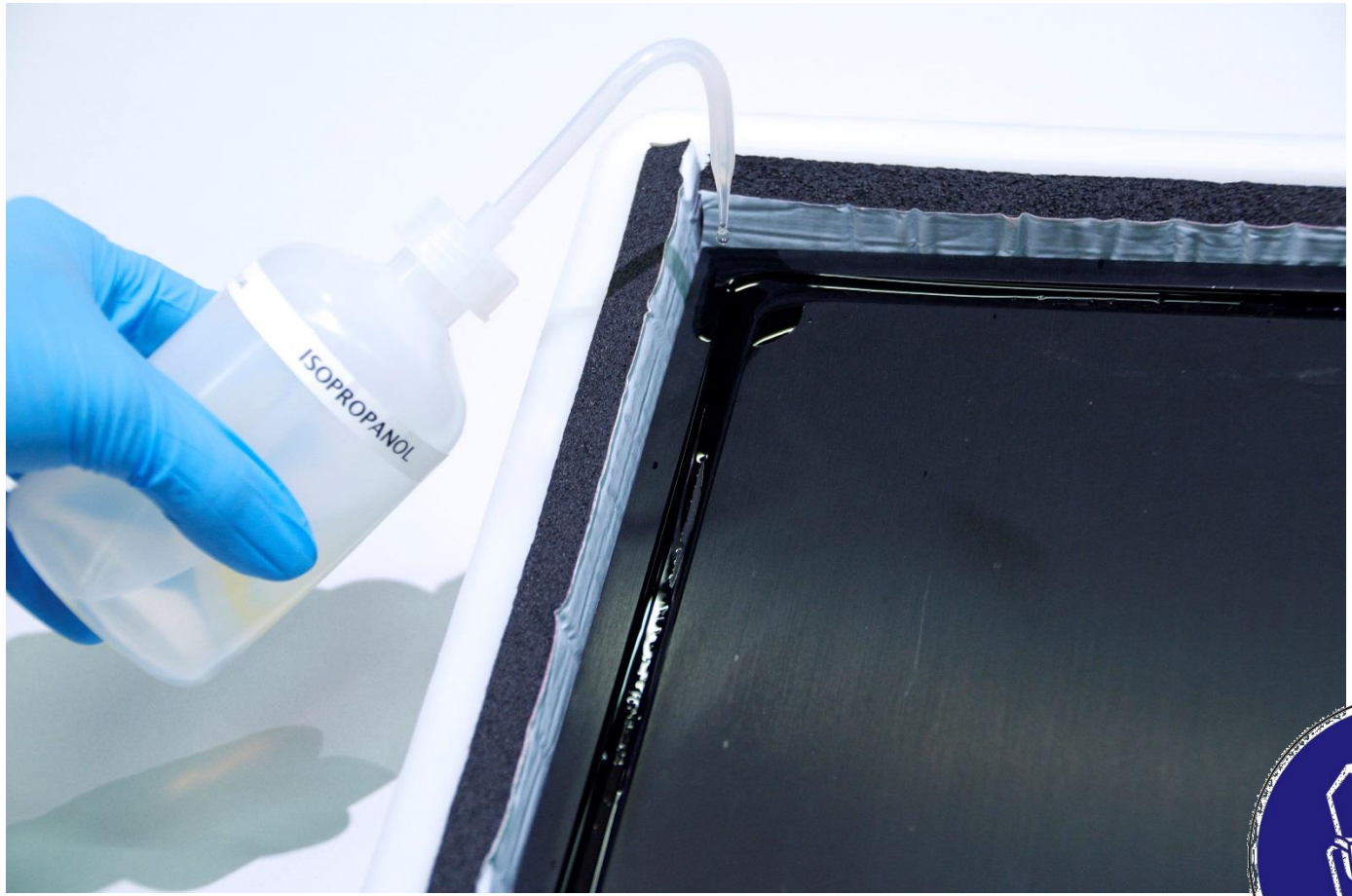
CERN

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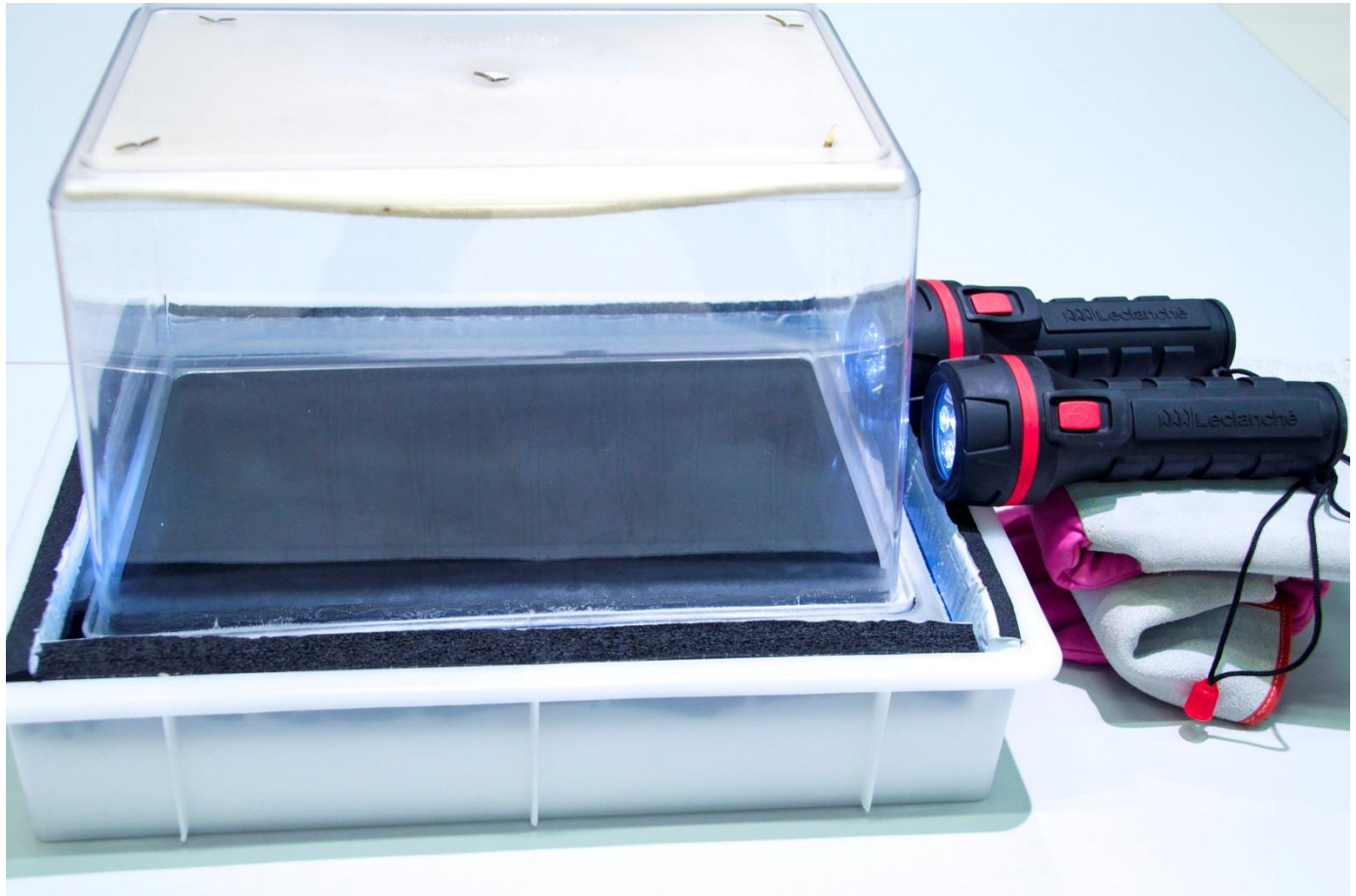

Ledlanché
Ledlanché

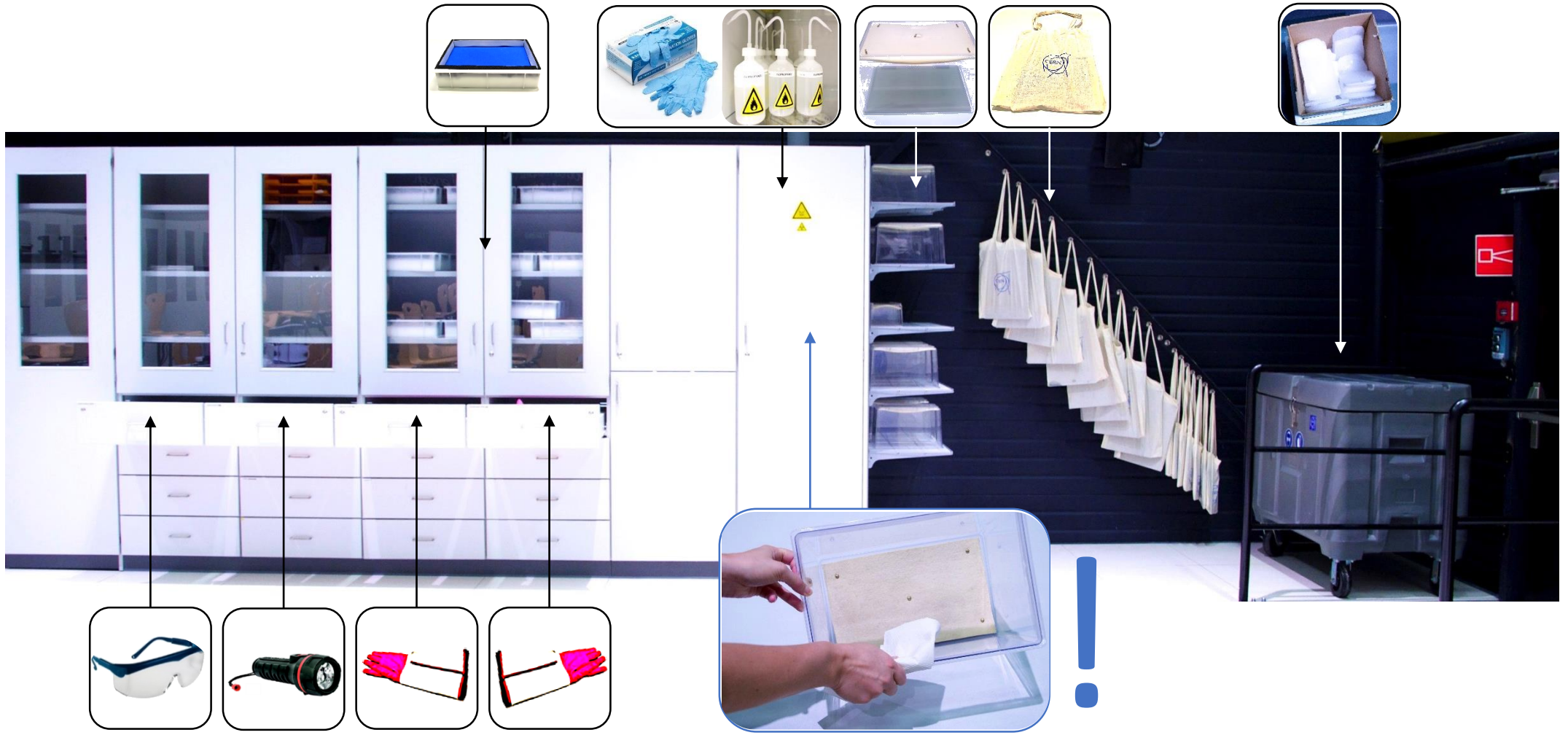
☞ Build your own particle detector!

☞ Build your own particle detector!

Tasks

- Observe your Cloud Chamber
- Find the optimal torch position and the optimal observation position
- Describe visible tracks (shape, length, width, …)
- Discuss the reason for these tracks
- Count the number of tracks you can see for 1 minute, repeat this measurement 2 times

☞ Tidying up



Discussion and explanations

CosMO Experiment

Additional Material

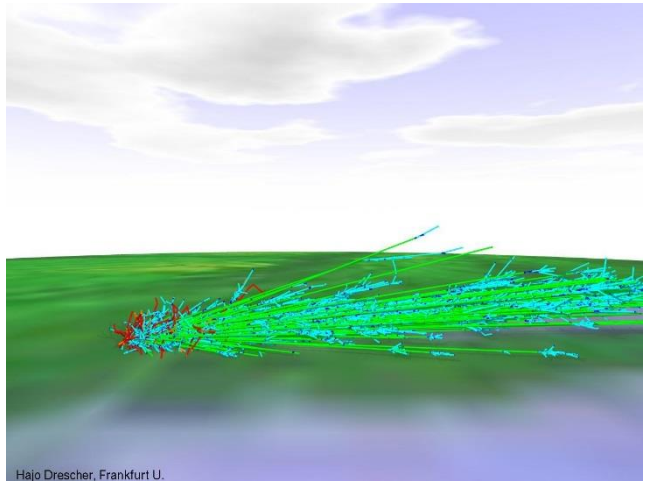
Air Shower Simulation

Cosmic Ray Air Shower Pictures

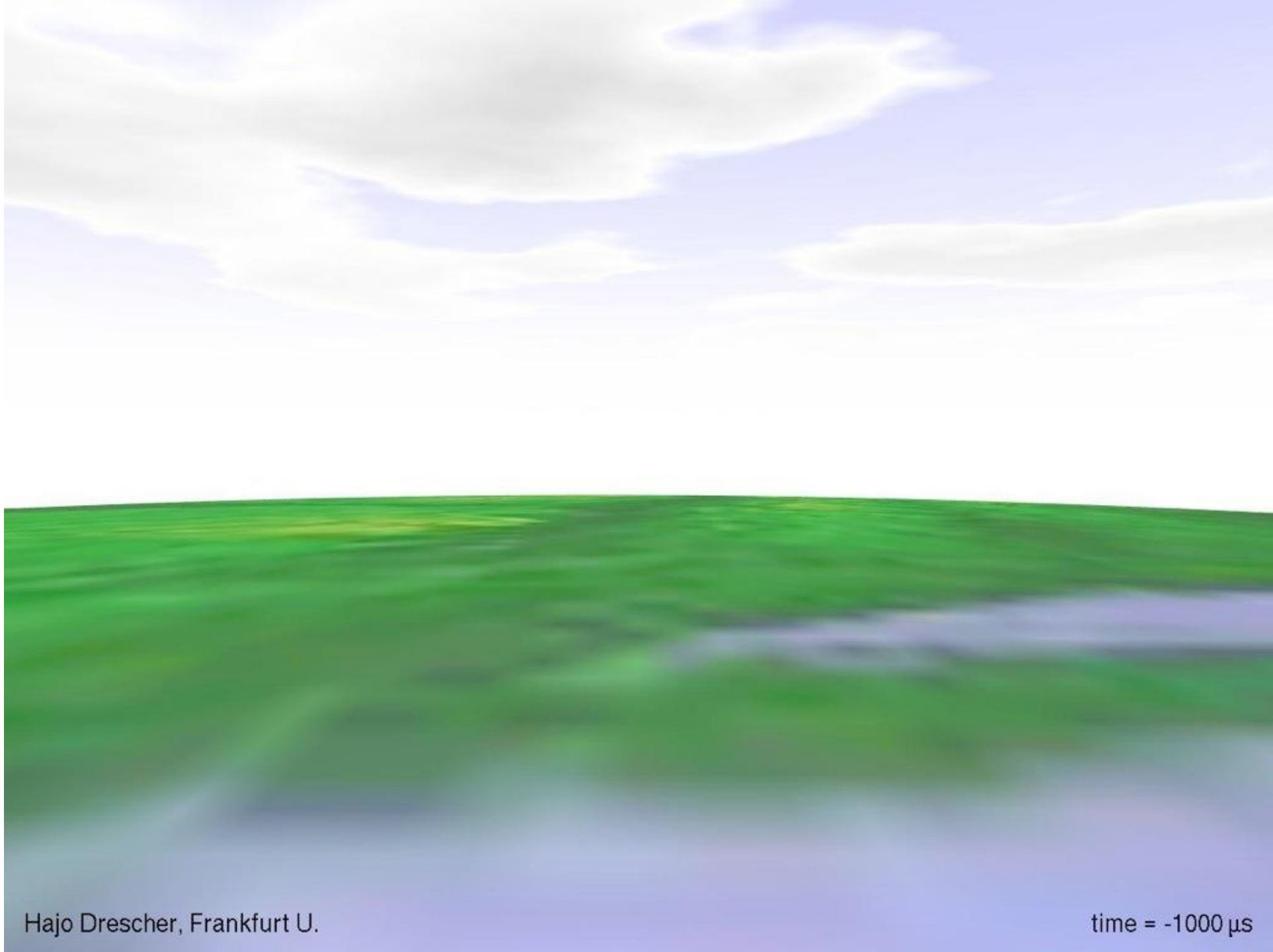
by H.-J. Drescher drescher@th.physik.uni-frankfurt.de.

Air showers are cascades of secondary particles induced in the atmosphere by high energy cosmic rays. What you see here is a **visualisation of realistic simulations of these showers**. Of course, not all of the particles in a shower are displayed, there are far too many! The **fraction displayed here is about 1e-6**, sampled with a **thinning algorithm**.

blue:electrons/positrons
cyan:photons
red:neutrons
orange: protons
gray: mesons
green:muons



http://th.physik.uni-frankfurt.de/~drescher/CASSIM/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Hajo Drescher, Frankfurt U.
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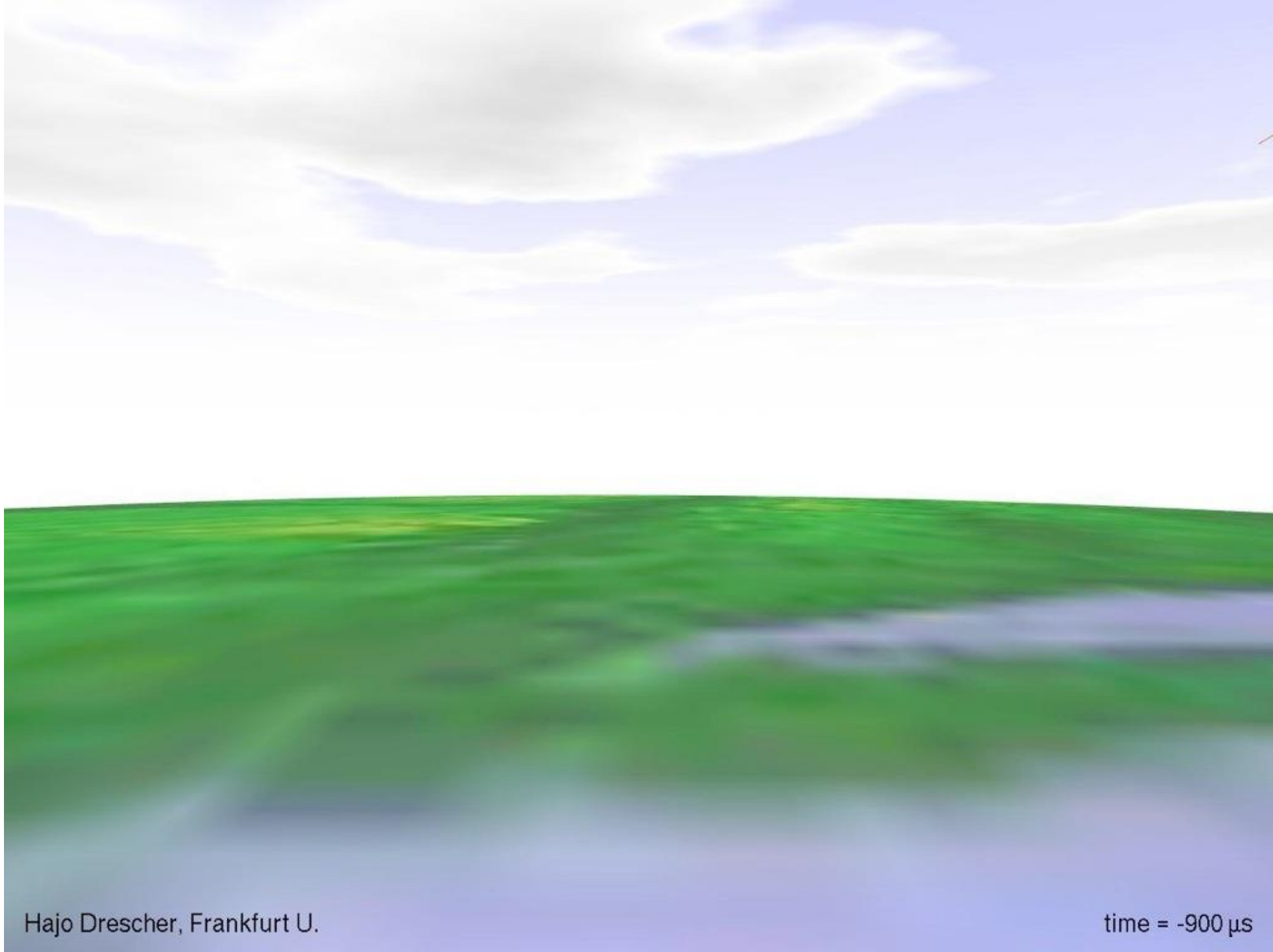
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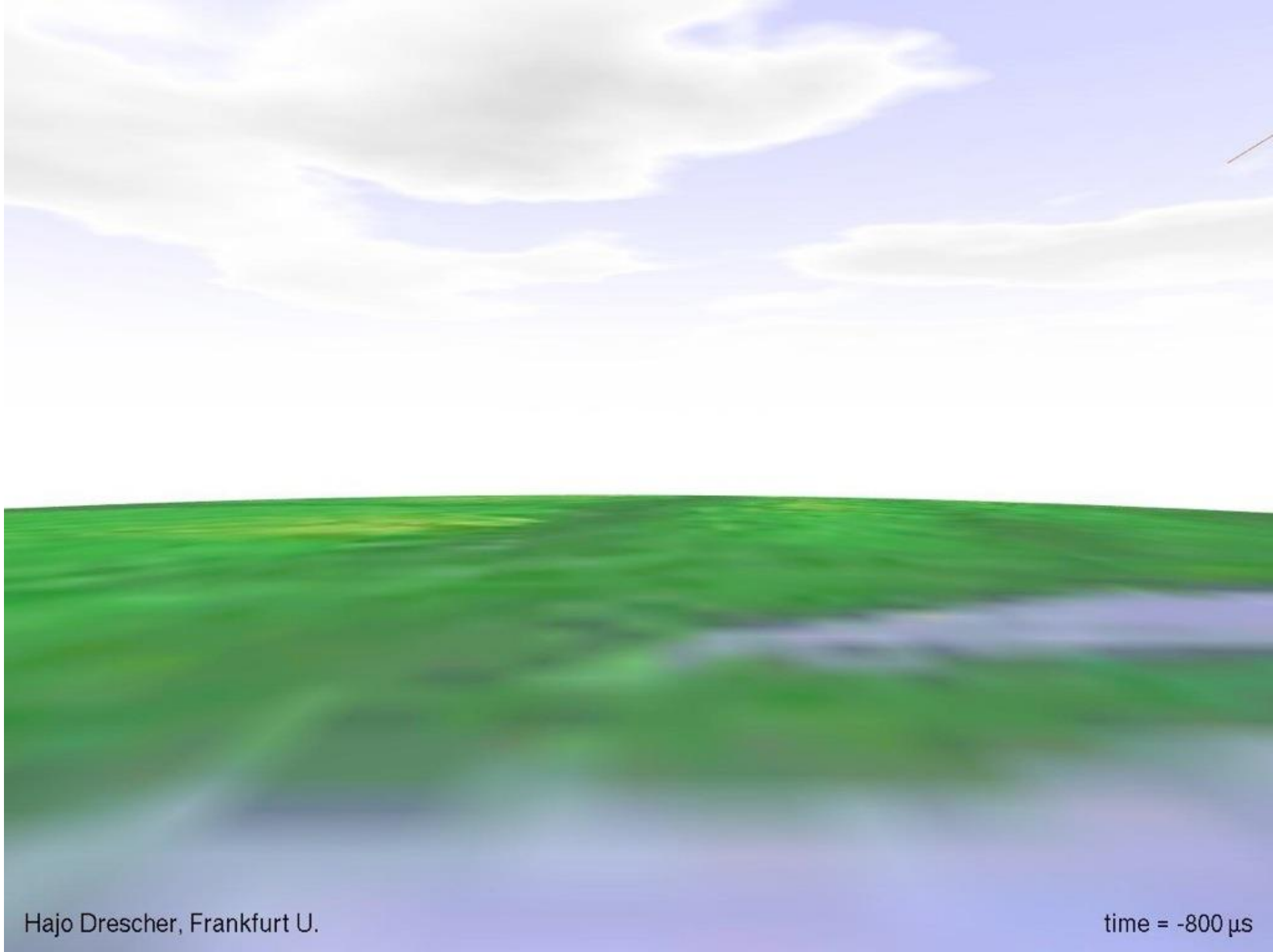
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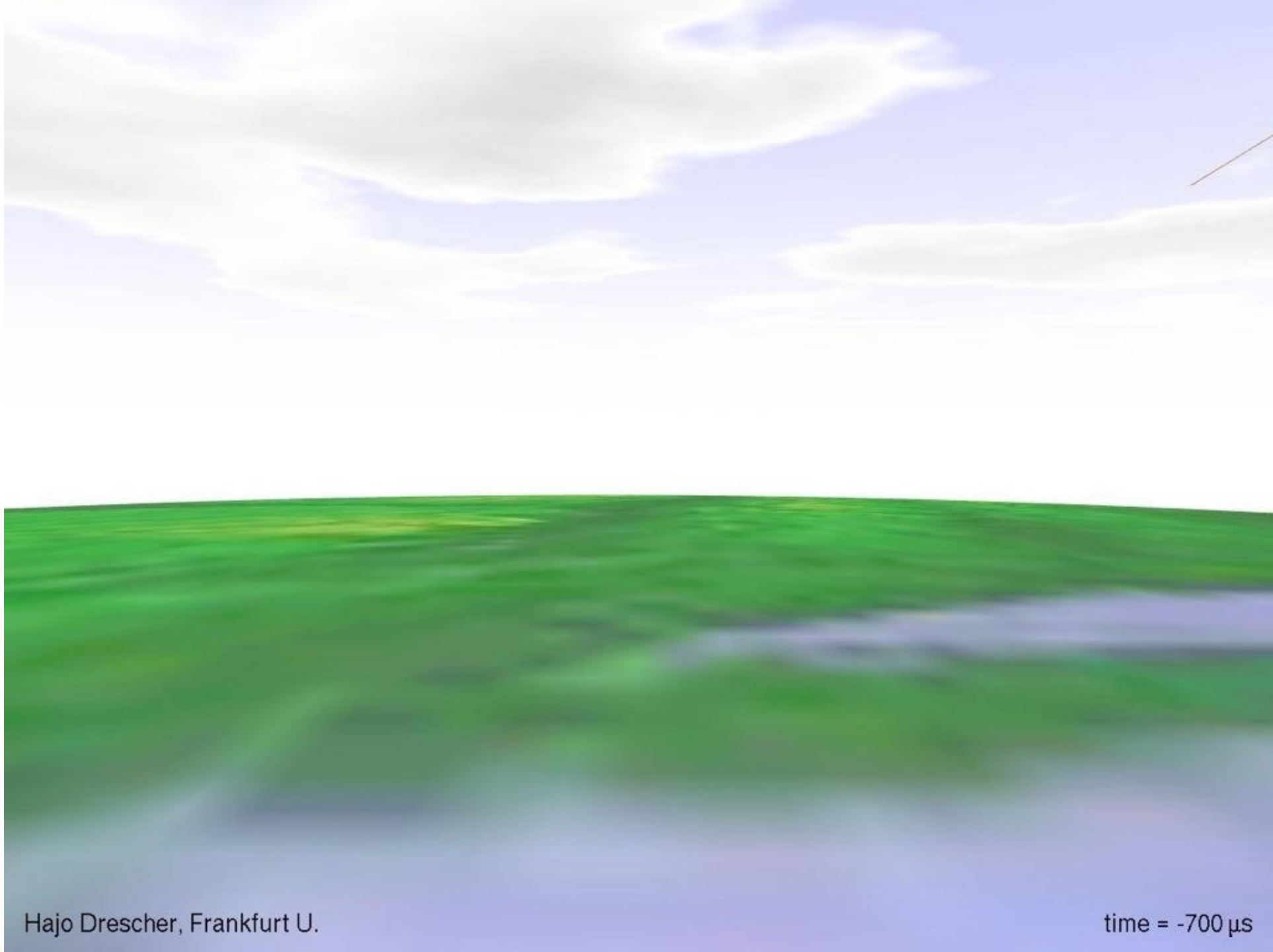
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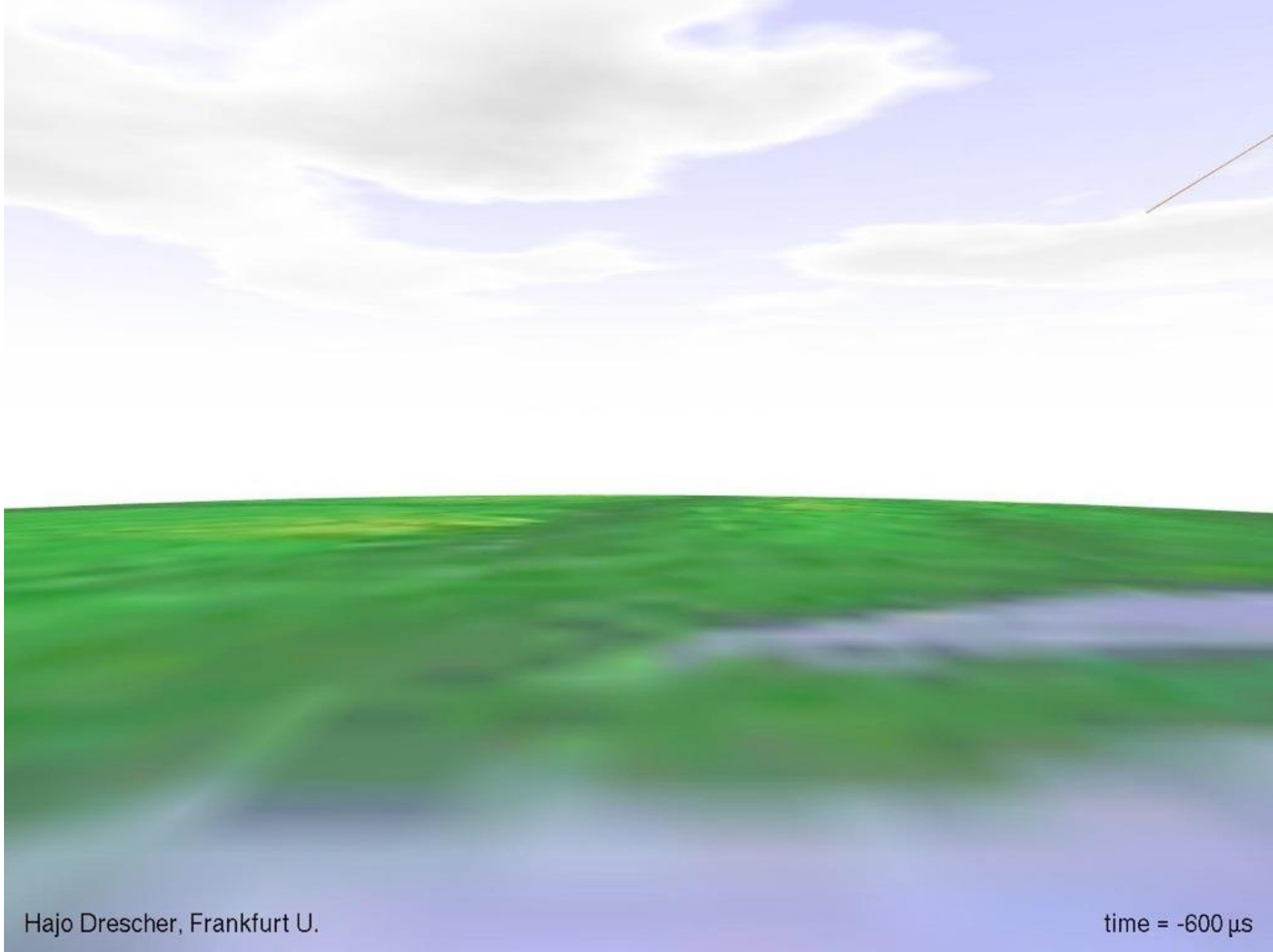
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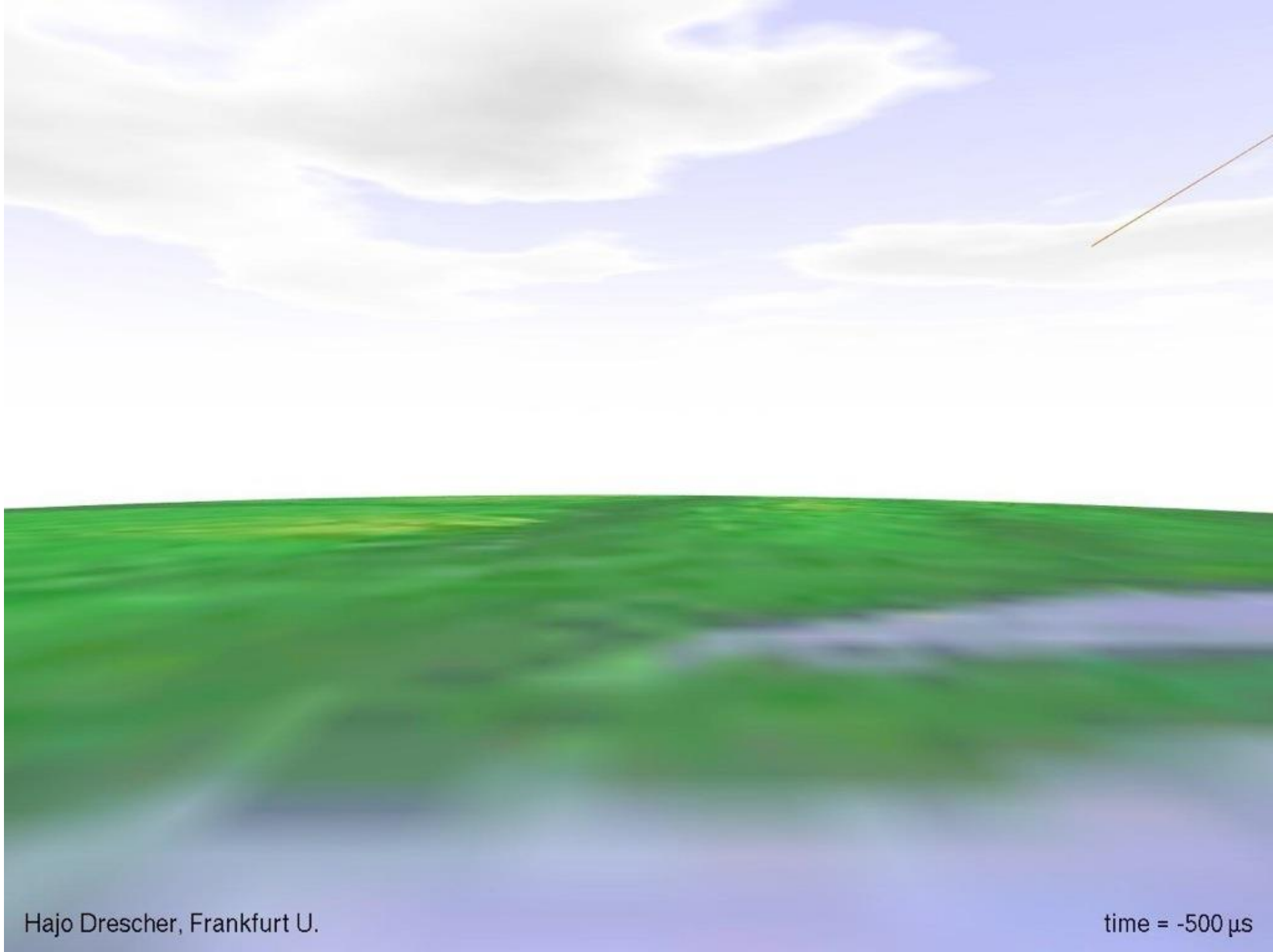
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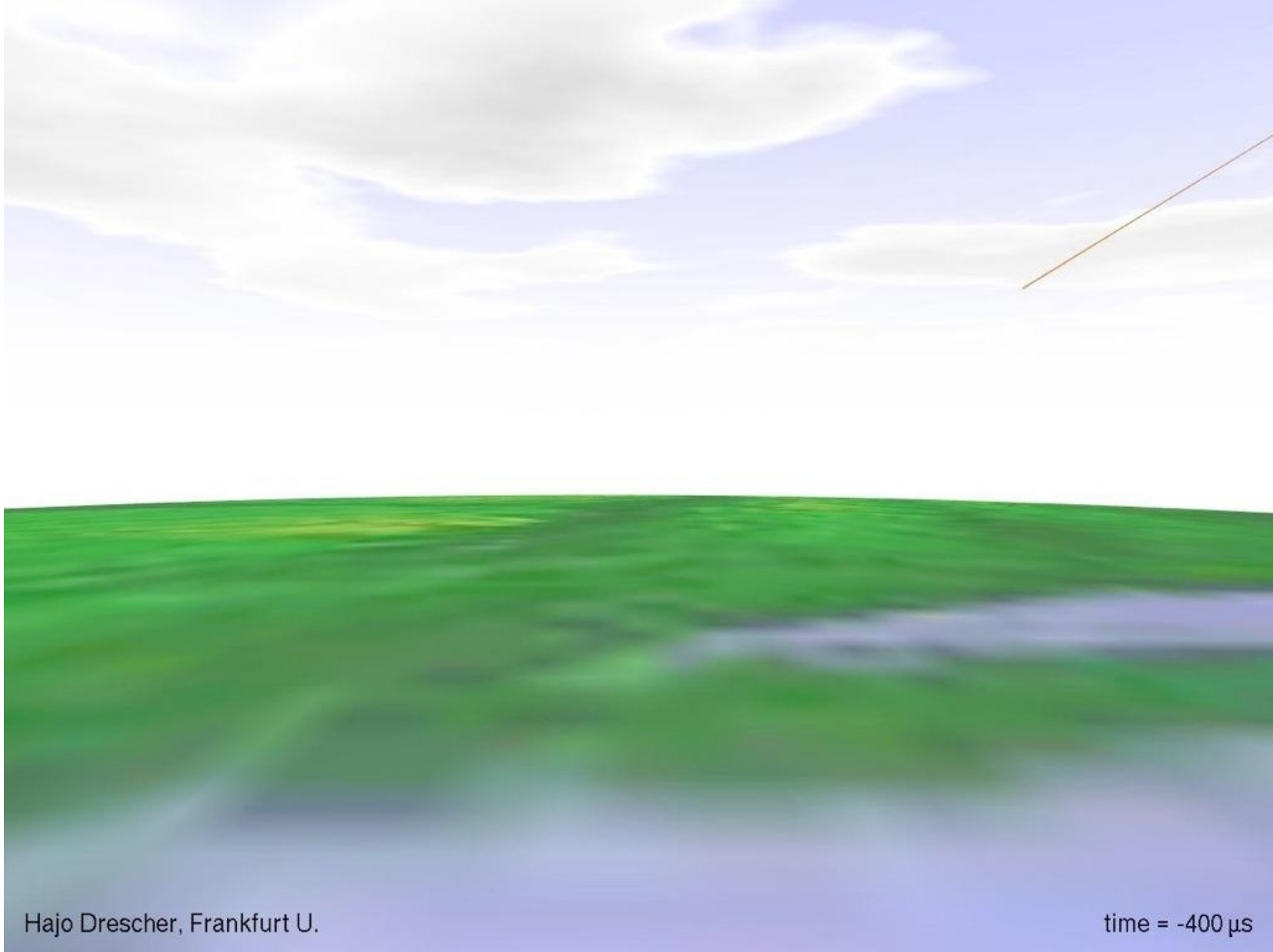
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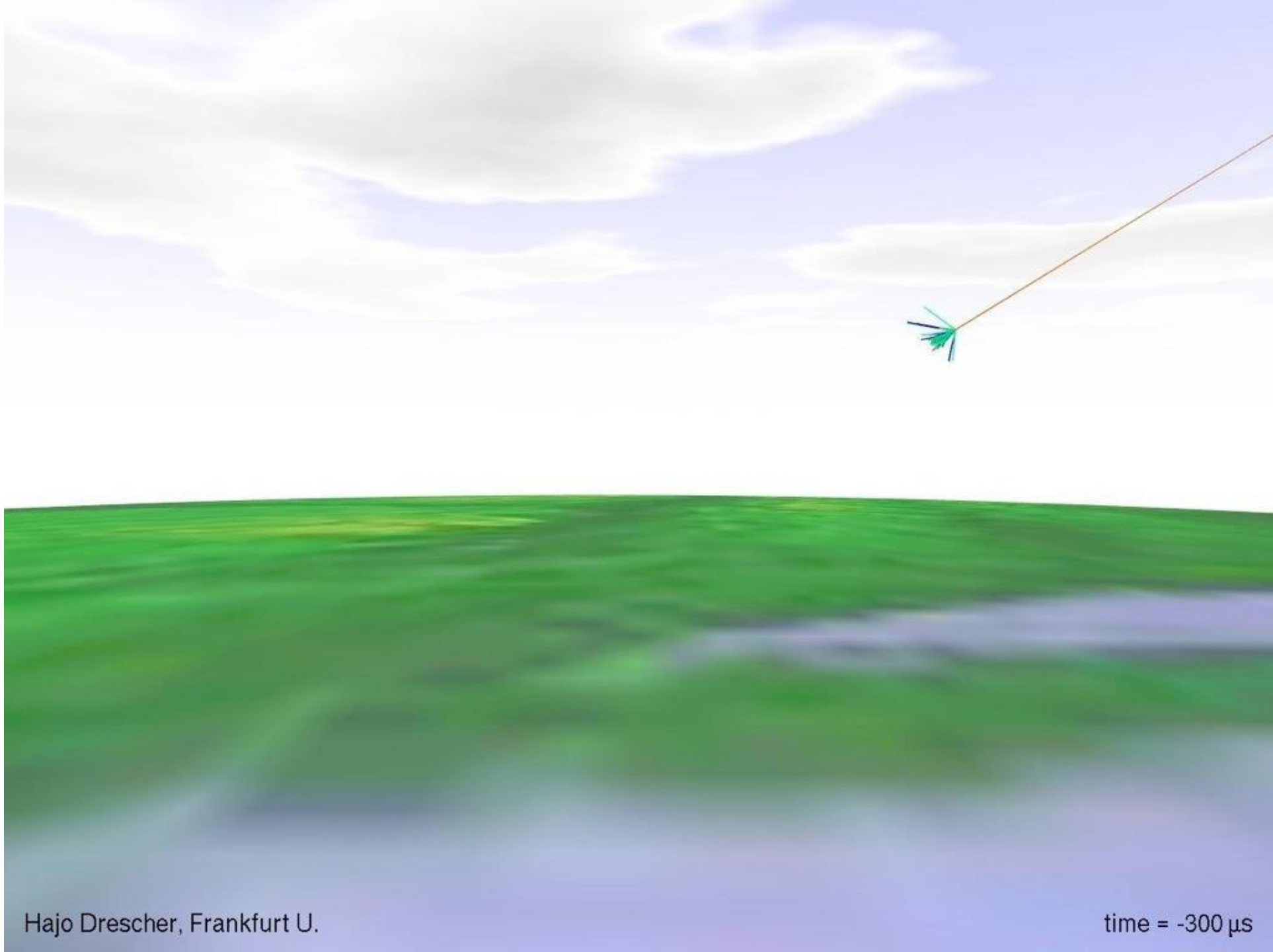
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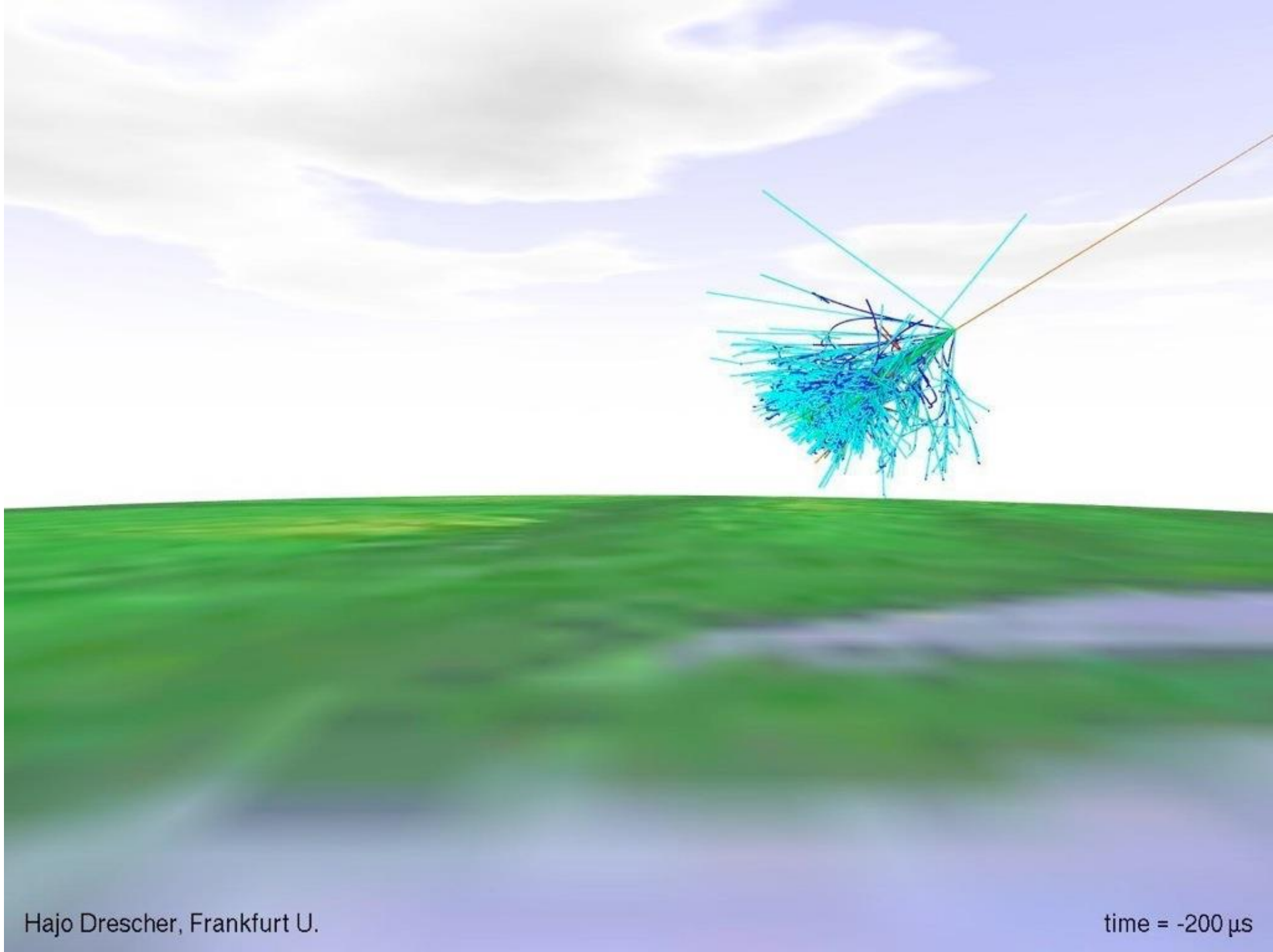
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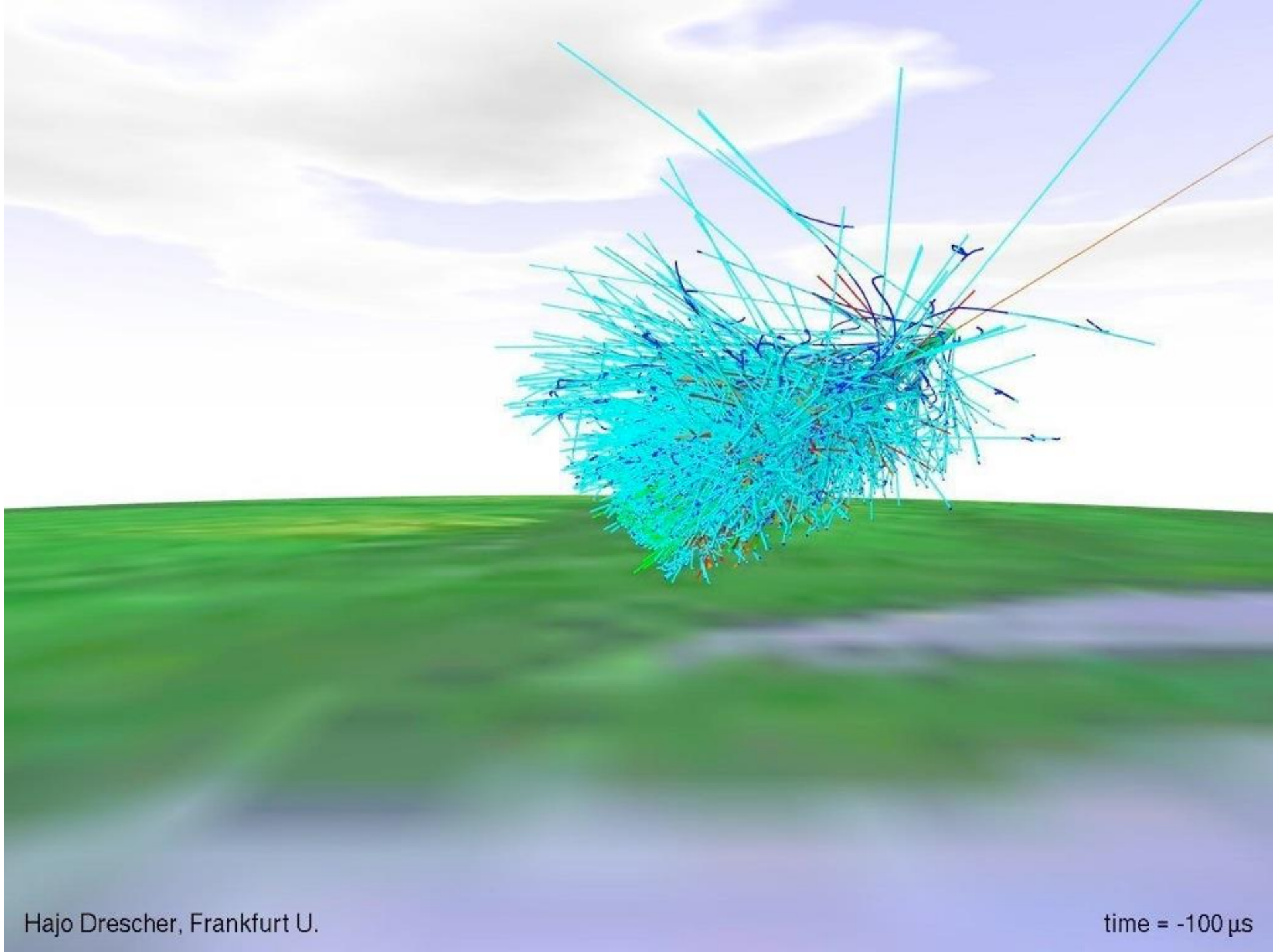
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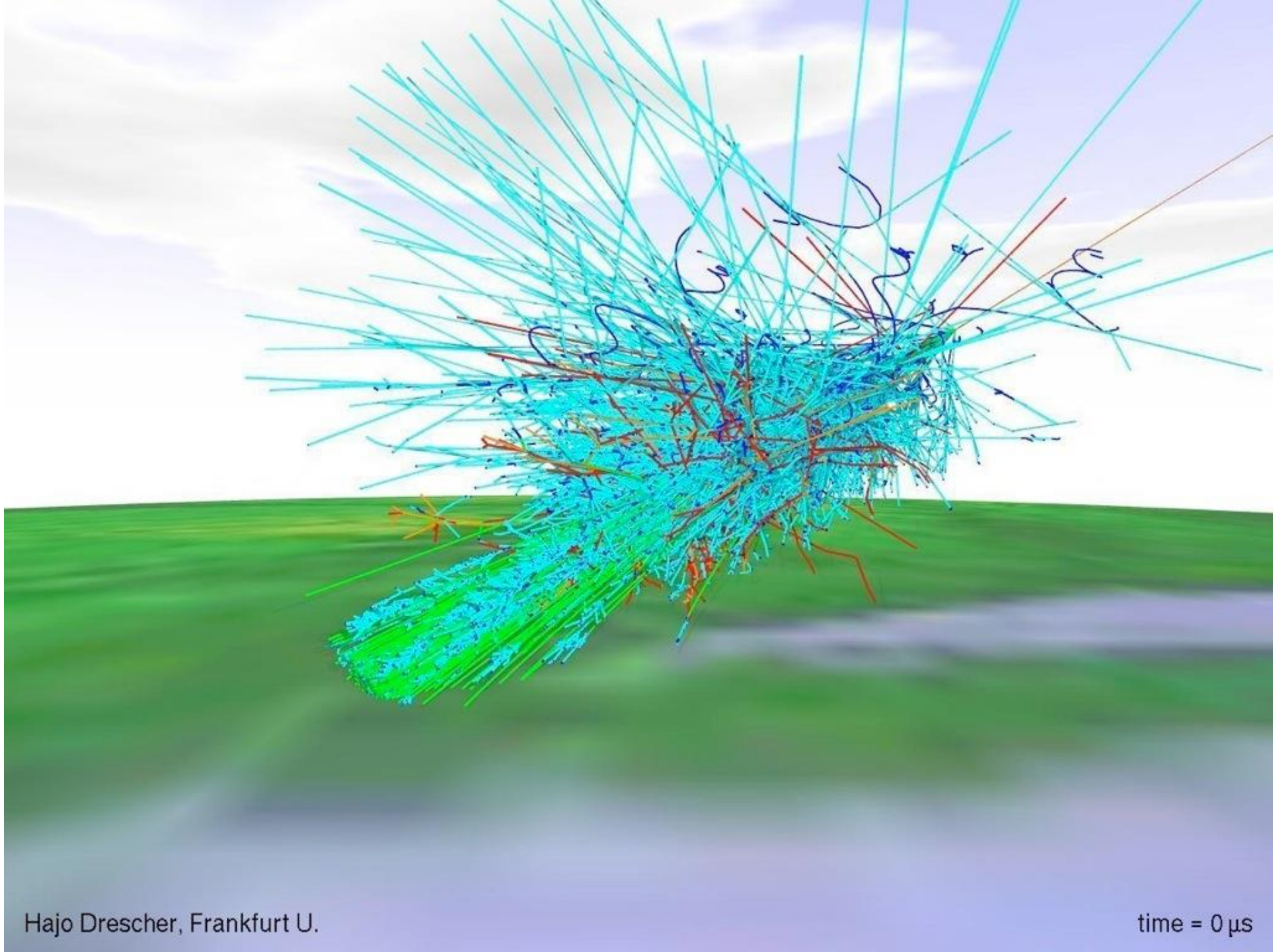
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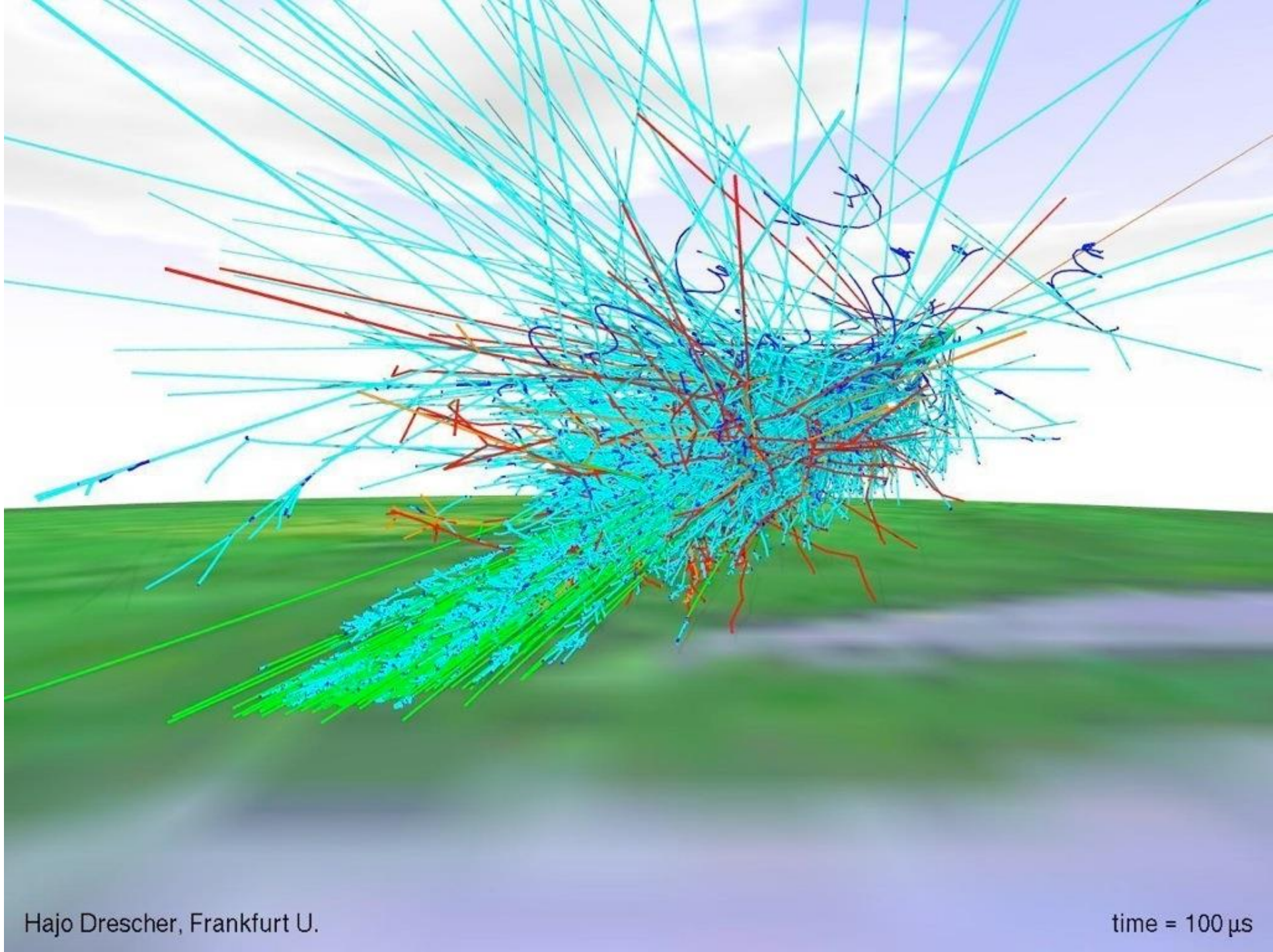
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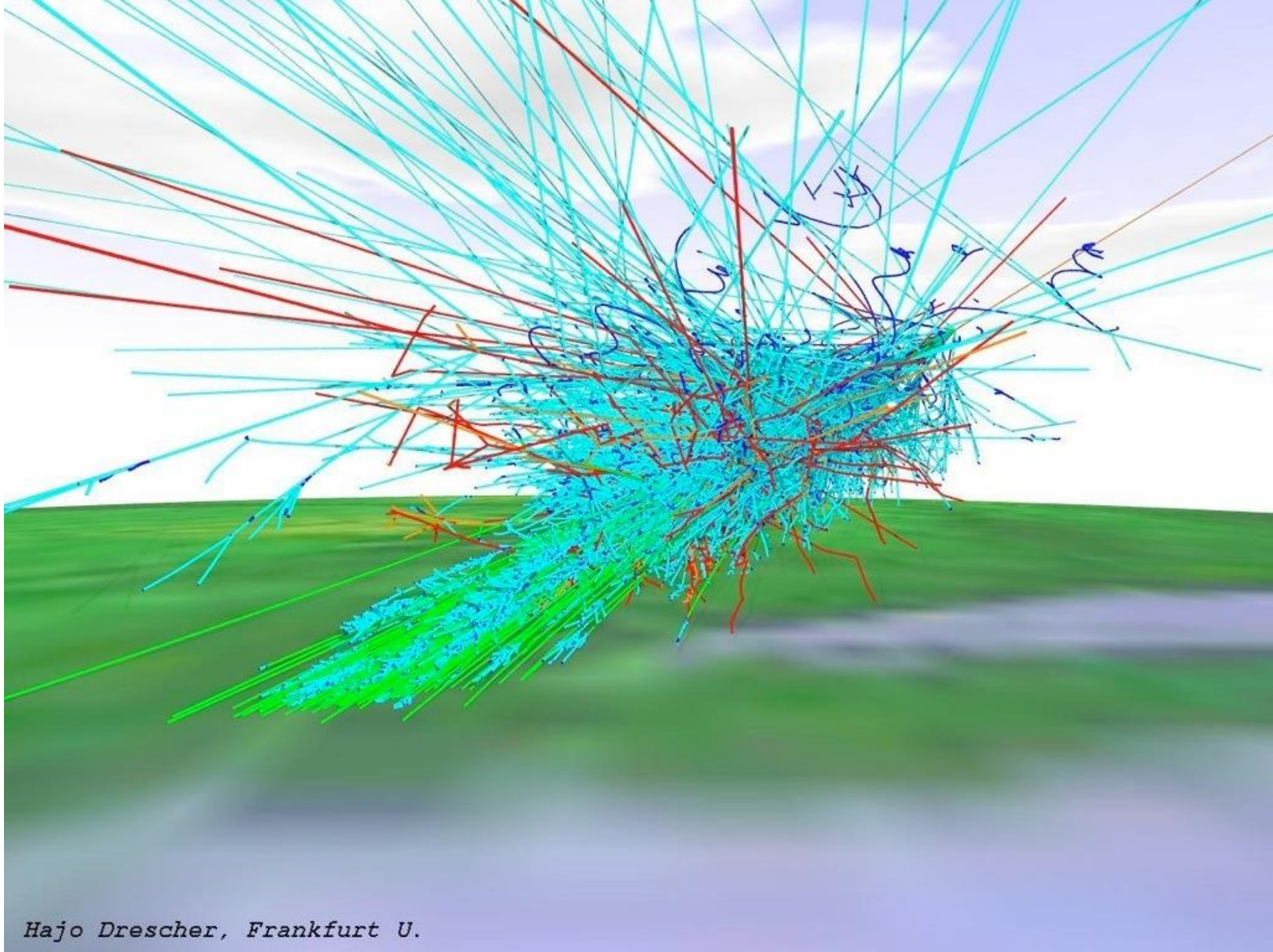
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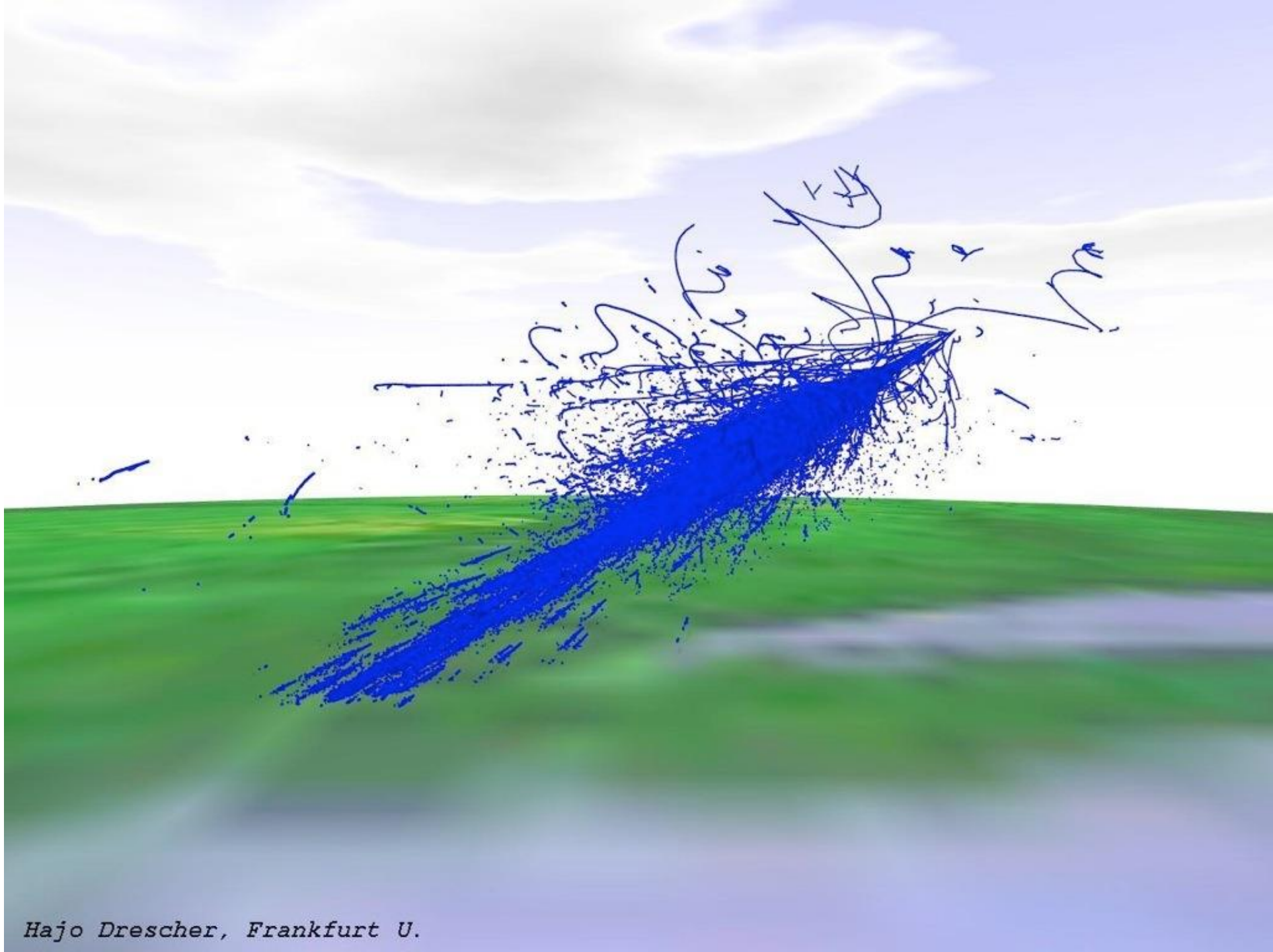
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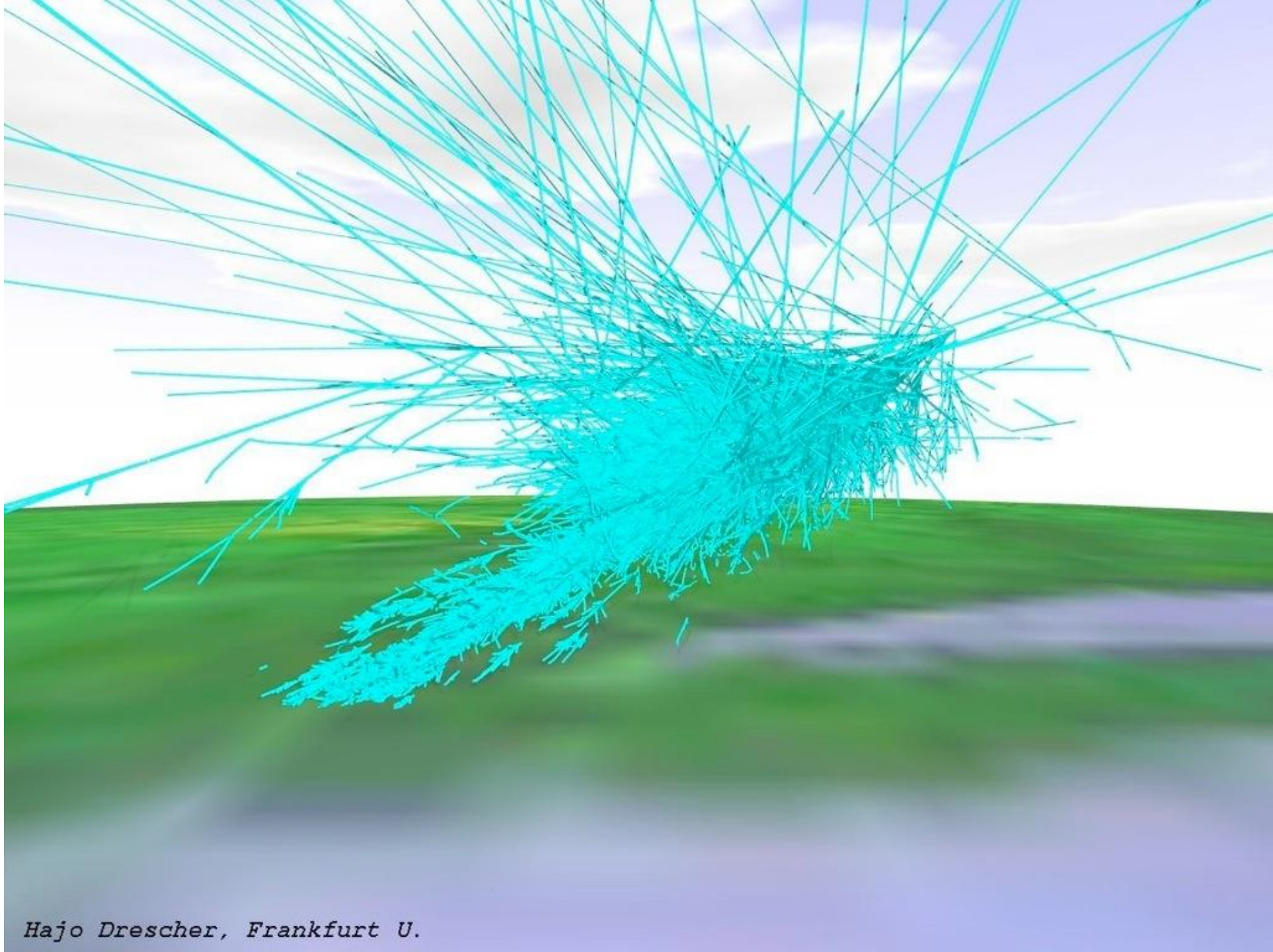
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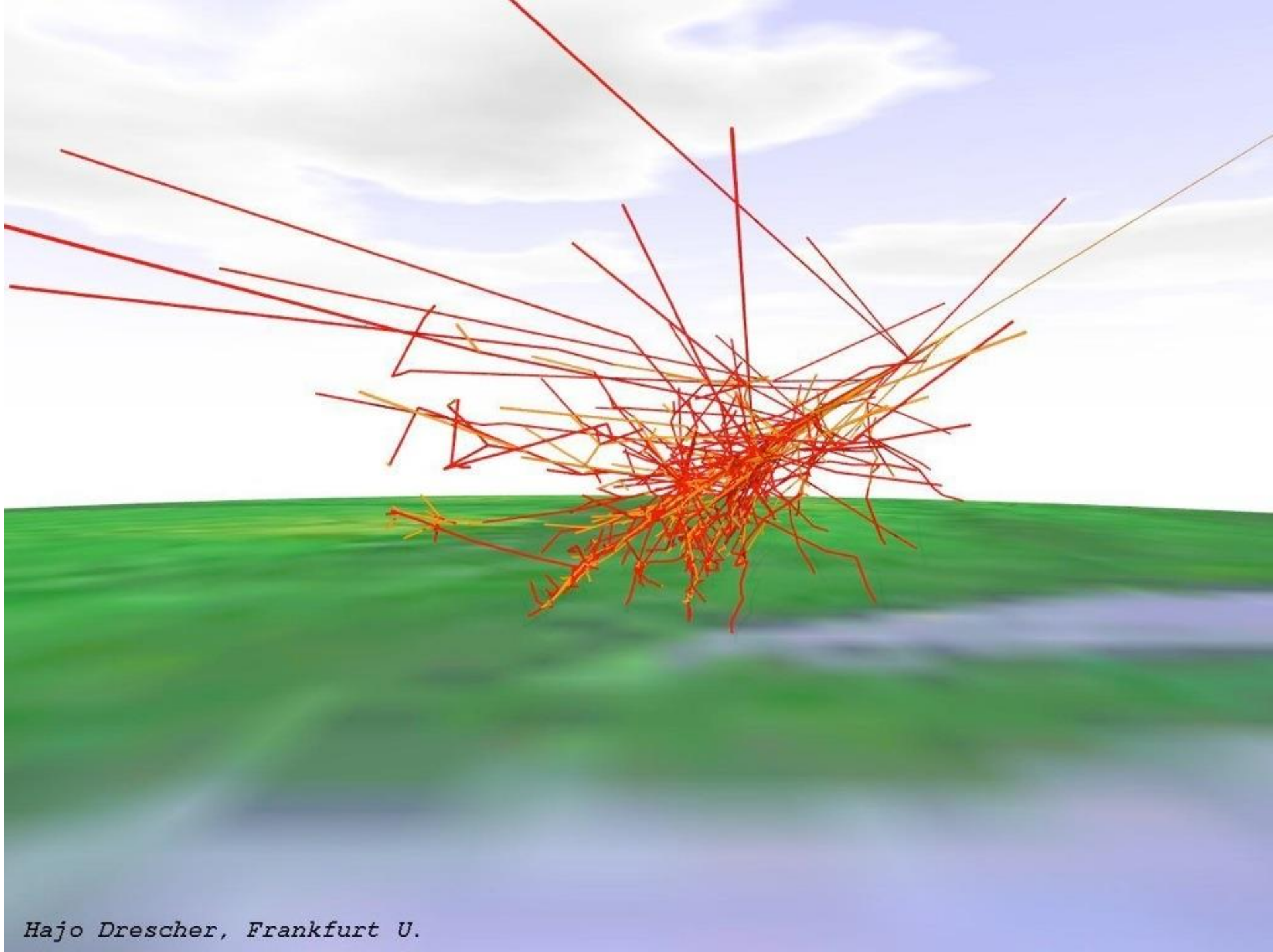
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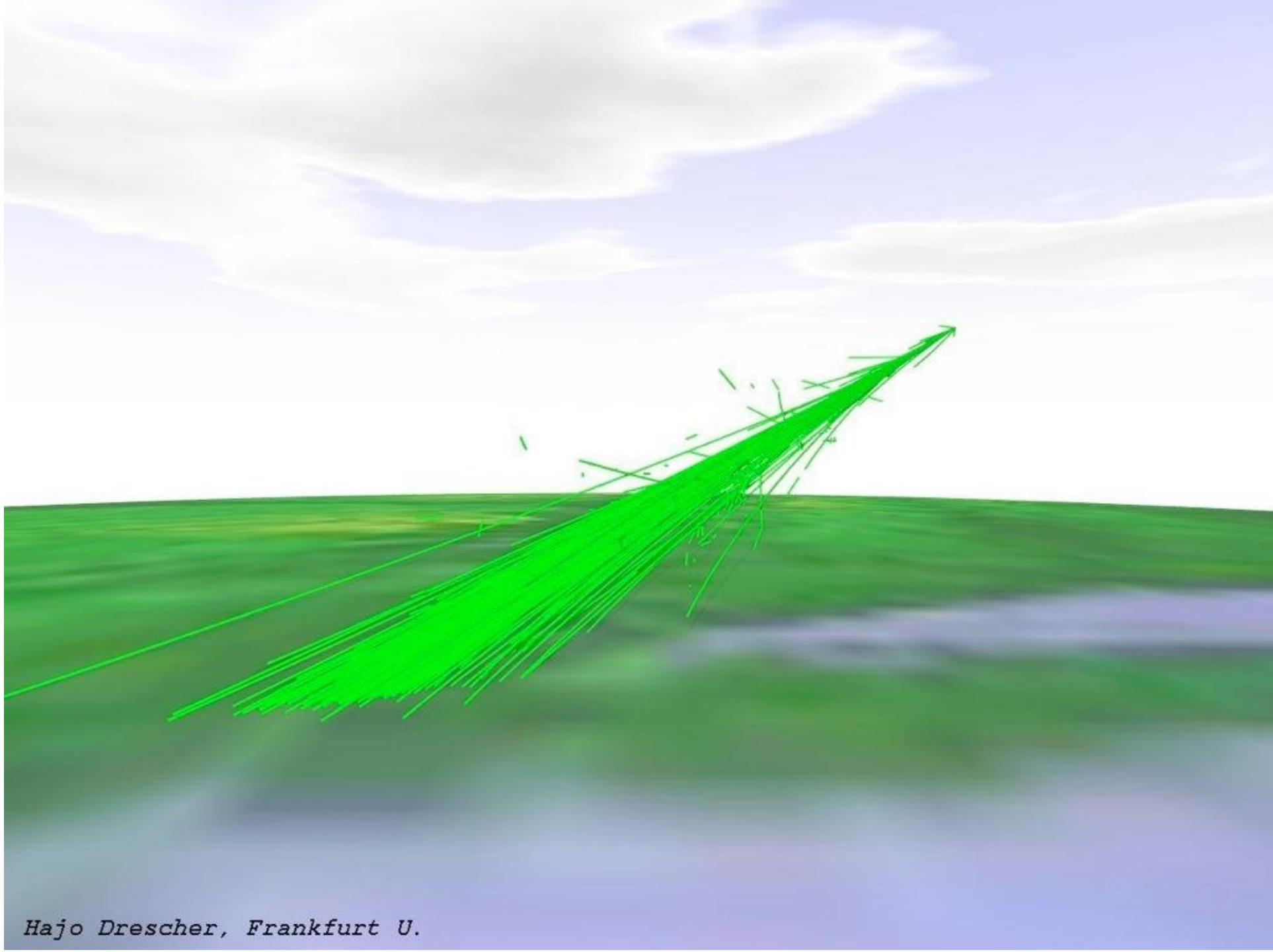
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