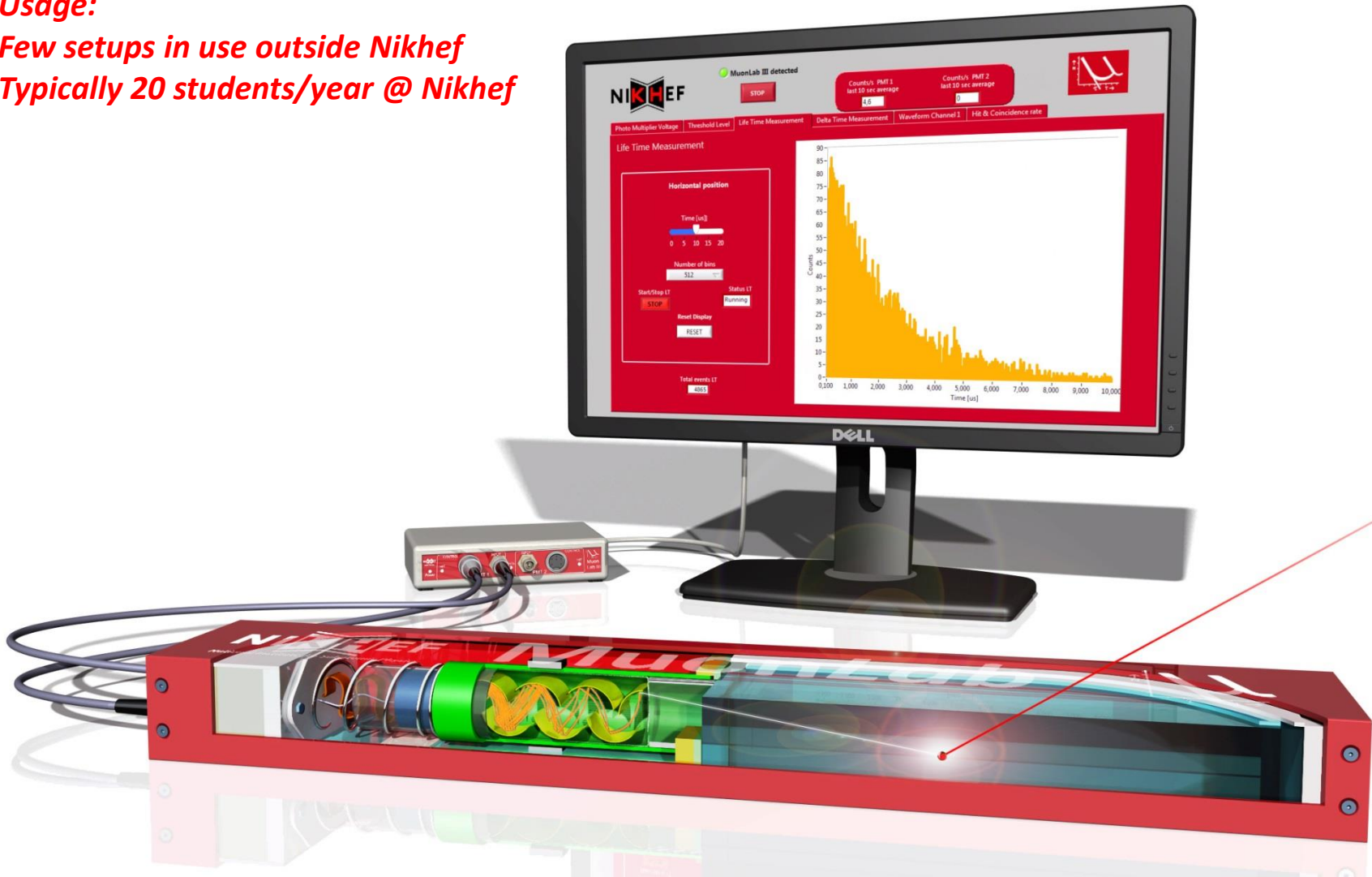


Muon lifetime and other (classroom) experiments/initiatives in Amsterdam

Frank Linde – Nikhef & UvA

Muon lifetime measurement setup

Usage:
Few setups in use outside Nikhef
Typically 20 students/year @ Nikhef



2000 € (ex VAT): two scintillators, one DAQ controller, cables & (LabView) software. No computer

And also ...

PMT High-Voltage settings

STOP

NIKHEF MuonsLab III 105 detected

Counts/s PMT 1 last 10 sec average: 5.9

Counts/s PMT 2 last 10 sec average: 3.6

Photo Multiplier Voltage

Photo Multiplier 1: Hamamatsu

Set Input PMT 1: Hamamatsu R850

High Voltage PMT 1: 1550

Photo Multiplier 2: Hamamatsu

Set Input PMT 2: Hamamatsu R850

High Voltage PMT 2: 1550

Photo Multiplier Tube

Incoming Photon, Photoemissive Cathode, Dynodes, Anode, Secondary Electrons, Output, High Voltage (-), Voltage Dropping Resistors

Scintillator pulses

STOP

NIKHEF MuonsLab III 105 detected

Counts/s PMT 1 last 10 sec average: 5.2

Counts/s PMT 2 last 10 sec average: 4.6

Waveform Channel 1

Start / Stop: START, Stopped

Trigger level CH1: Set trigger in Threshold Tab: 151

Vertical position

Offset Voltage (mV): 100

Amplitude (mV): 2000

Horizontal position

Pre-Trigger Time (ns): 100

Time (ns): 250

Waveform CH1

Amplitude [mV]

Time [ns]

Discriminator threshold settings

STOP

NIKHEF MuonsLab III 105 detected

Counts/s PMT 1 last 10 sec average: 4.3

Counts/s PMT 2 last 10 sec average: 3.6

Threshold Level

Channel 1

Voltage [mV]: 400

Photo Multiplier Channel 1

Analog signal

Voltage [mV]

Threshold level

Comparator

Trigger

Offset

5 ns Sampling

Waveform Channel 1

Channel 2

Voltage [mV]: 400

Photo Multiplier Channel 2

Analog signal

Voltage [mV]

Threshold level

Comparator

Trigger

Muon velocity

STOP

NIKHEF MuonsLab III 105 detected

Counts/s PMT 1 last 10 sec average: 4.5

Counts/s PMT 2 last 10 sec average: 3.2

Delta Time Measurement

Horizontal position

x-as minimum (ns): -100

x-as maximum (ns): 100

Start/Stop DT: STOP

Status DT: Running

Reset Display: RESET

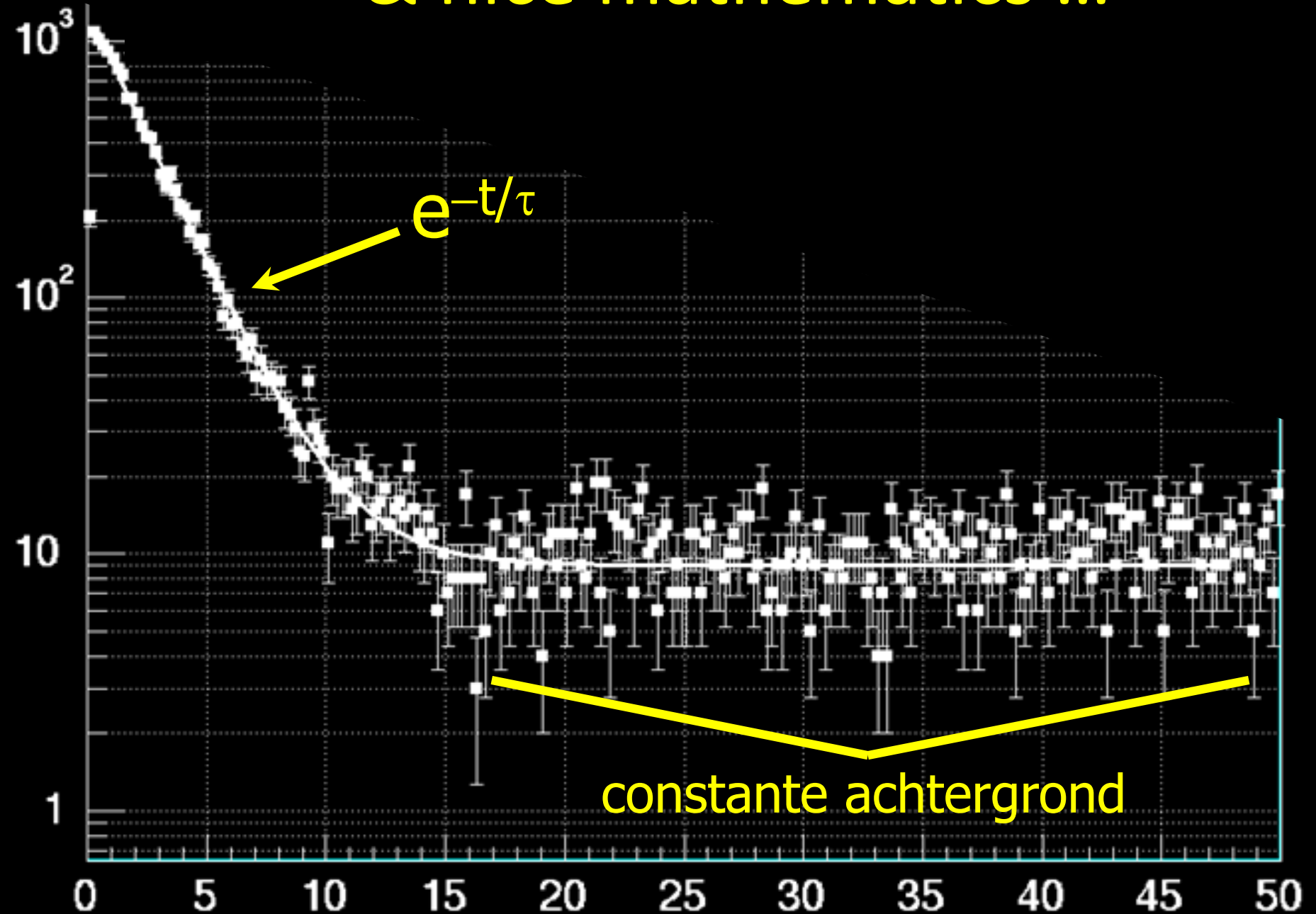
First channel hit: CH1, CH2

Delta Time Measurement

Counts

Time [ns]

& nice mathematics ...

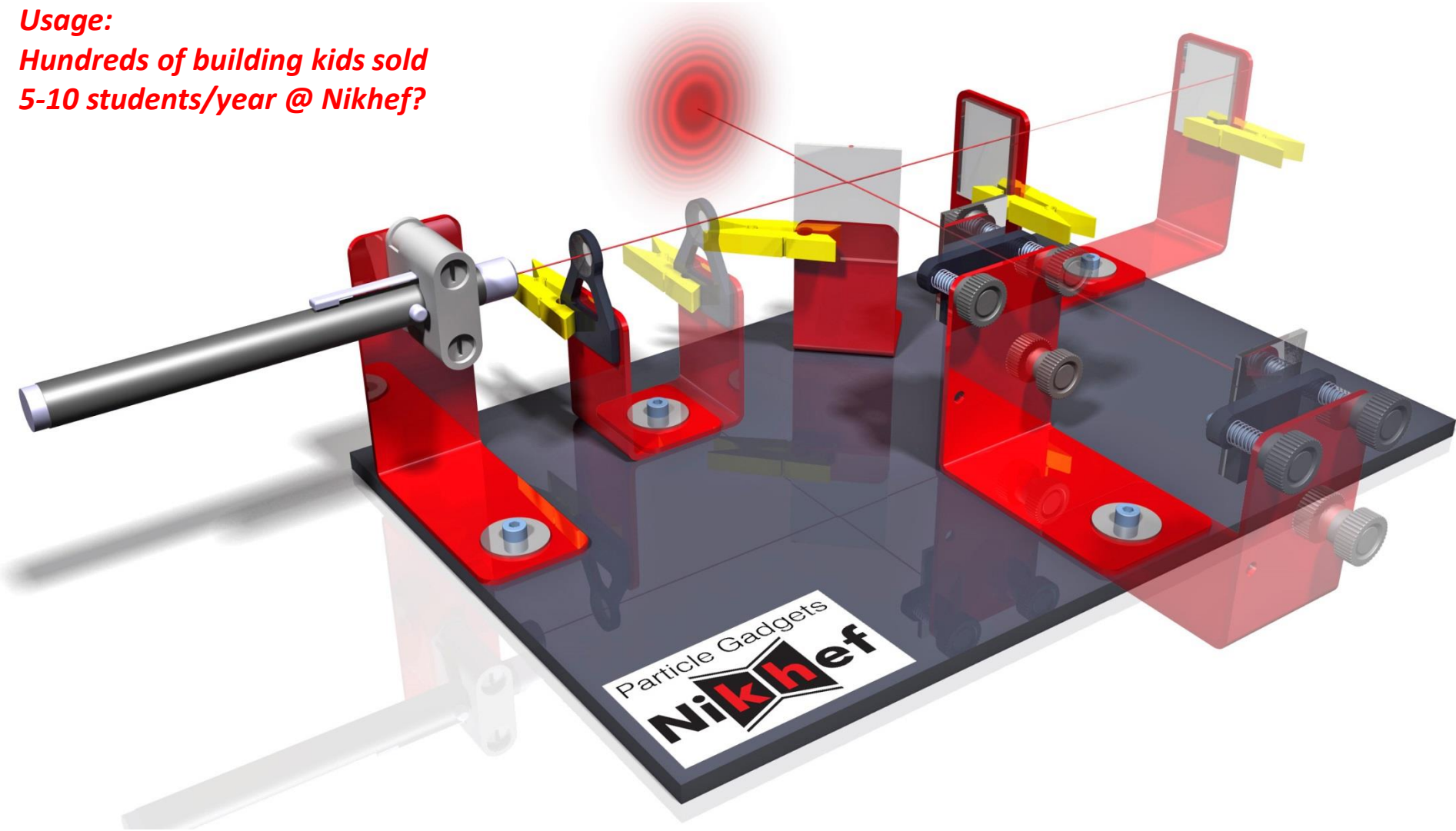


Build your own laser interferometer

Usage:

Hundreds of building kits sold

5-10 students/year @ Nikhef?

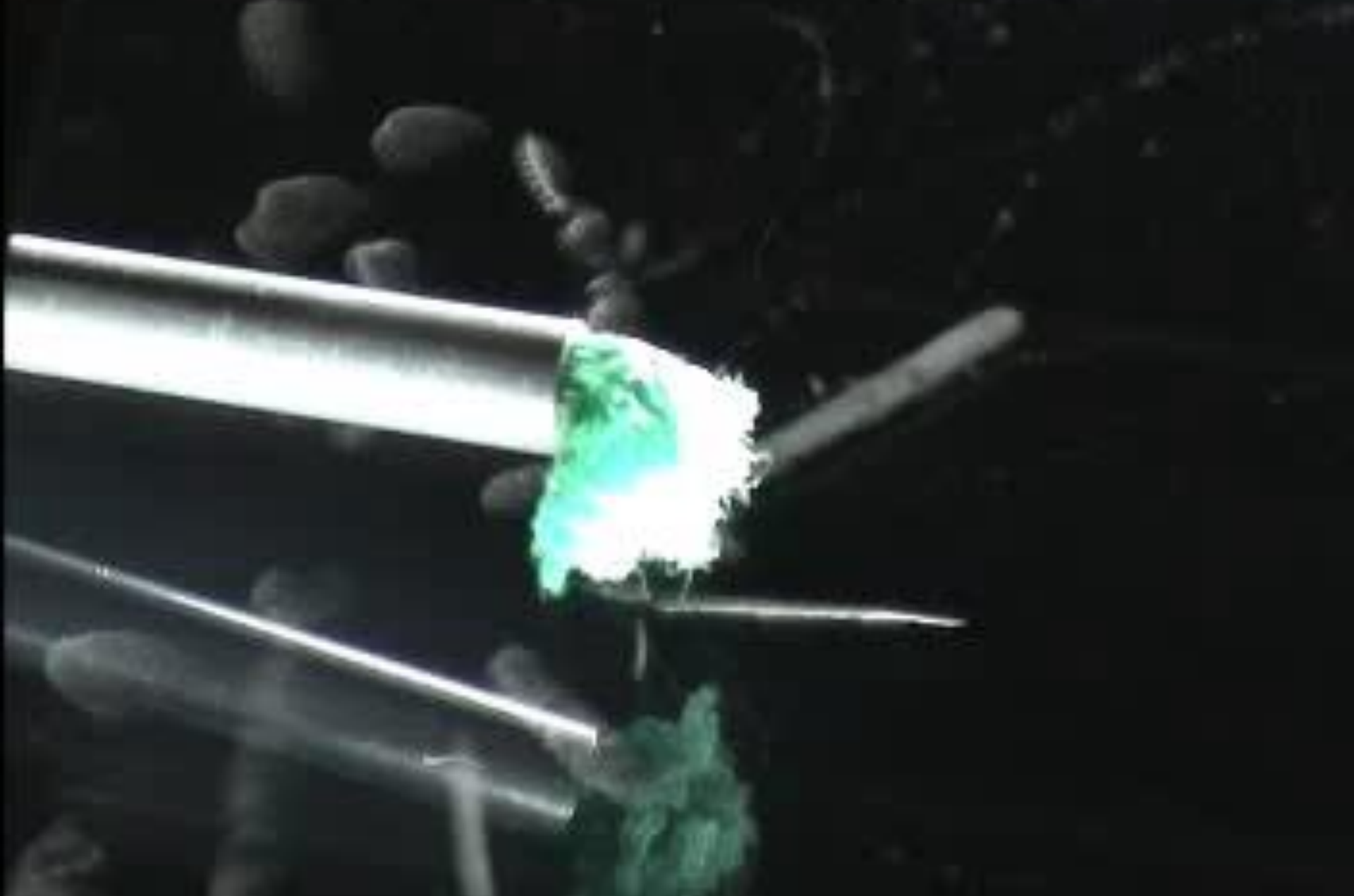


~ 79 € (ex VAT): complete build it your own kit

Build your own laser interferometer

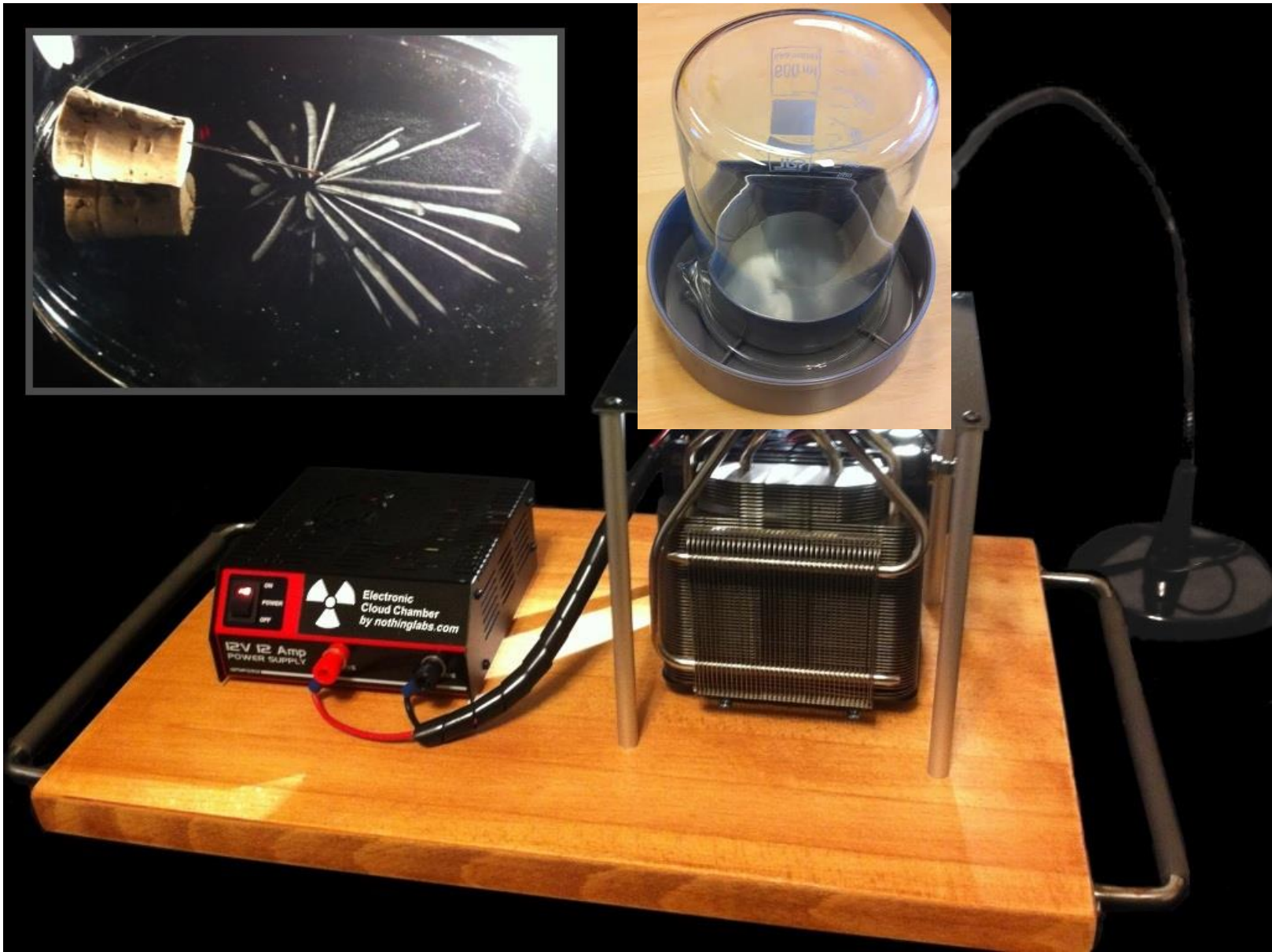
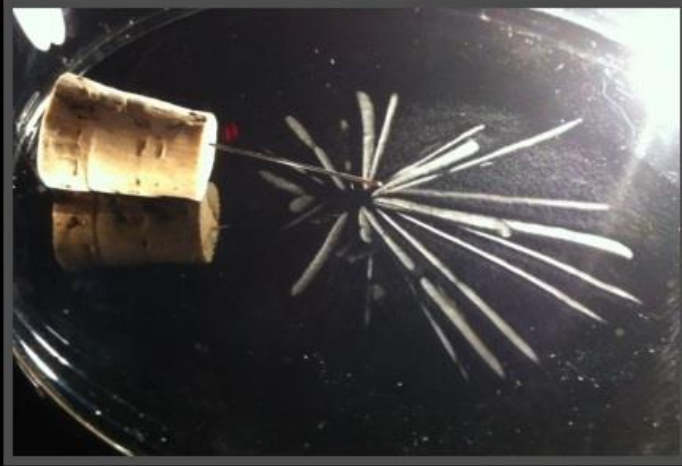


Build your own cloud chamber?

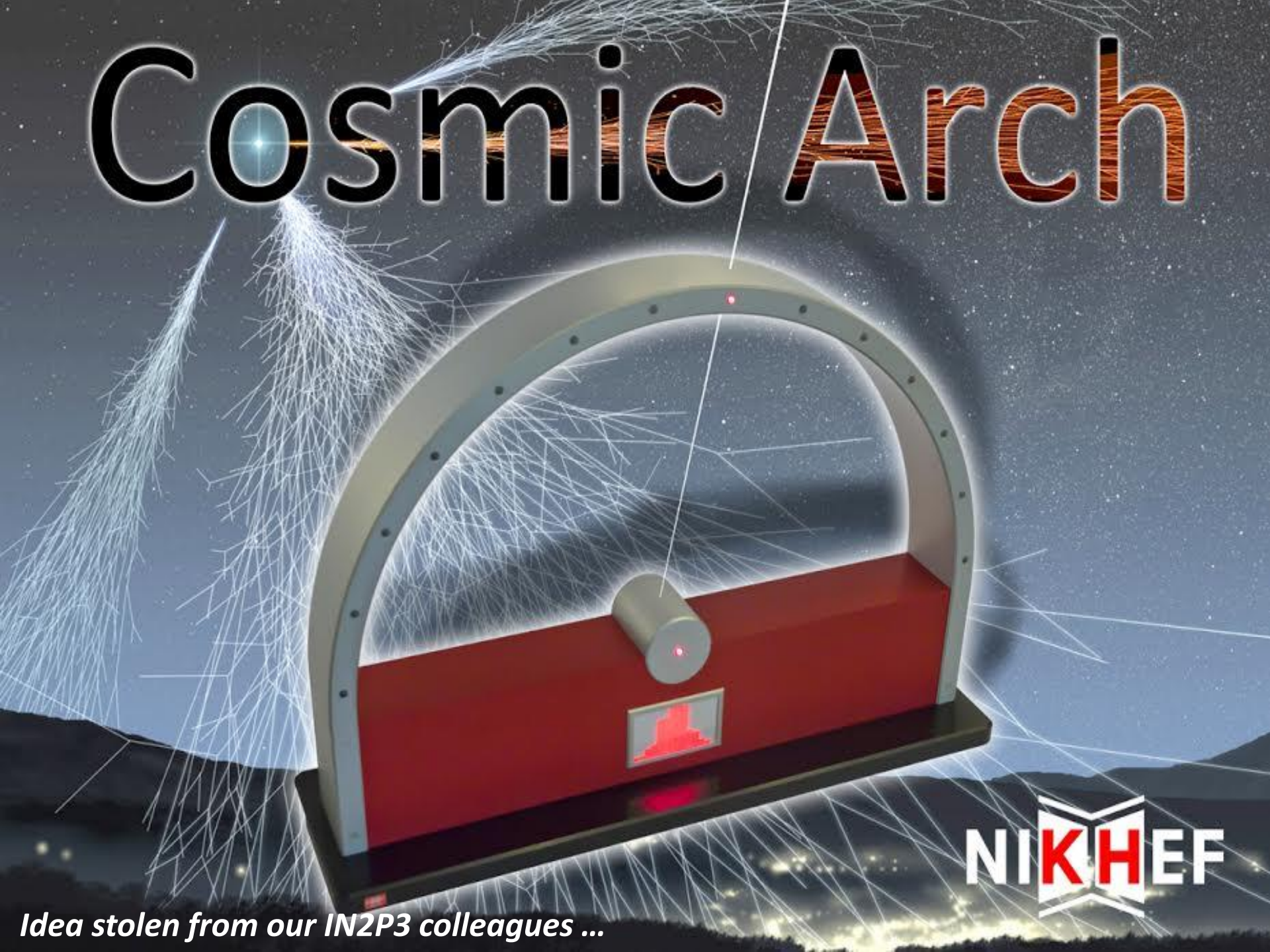


Build your own cloud chamber?

we failed sofar ... anyone with good experience?



Cosmic Arch



Idea stolen from our IN2P3 colleagues ...


***Exhibit includes: huge spark chamber
cloud chamber
scintillators
animations***




Popular (Dutch) websites *Age 14-18*

NATUURKUNDE.NL

≈ 1000,000 visitors/year
turnover 60 k€/year

 Meld je aan voor de nieuwsbrief!


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 Zoek in de website



Filmpjes

Op het internet kun je heel veel uitlegfilmpjes vinden die je kunnen helpen bij het begrijpen van de natuurkundelesstof. Ze zijn ook handig bij het voorbereiden van je eindexamen als je er even niet uitkomt. De meeste filmpjes zijn gemaakt door docenten. Wij hebben een groot aantal filmpjes voor je verzameld. Er zijn twee mogelijkheden om filmpjes te vinden: filteren op onderwerp of kijken per site of kanaal. Op deze pagina kun je filteren per onderwerp. Wil je per site of kanaal kijken, klik dan [hier](#), daar hebben we een aantal nuttige websites en YouTube-kanalen op een rij gezet.

Alle onderwerp(en) 

[Filteren](#)



Popular (Dutch) websites *Age 11-14*

≈ 300,000 visitors/year



Kijk ook eens op onze andere websites:



Heb je een vraag over je werkstuk, schoolopdracht of iets anders? [Naar de vraagbaak »](#)