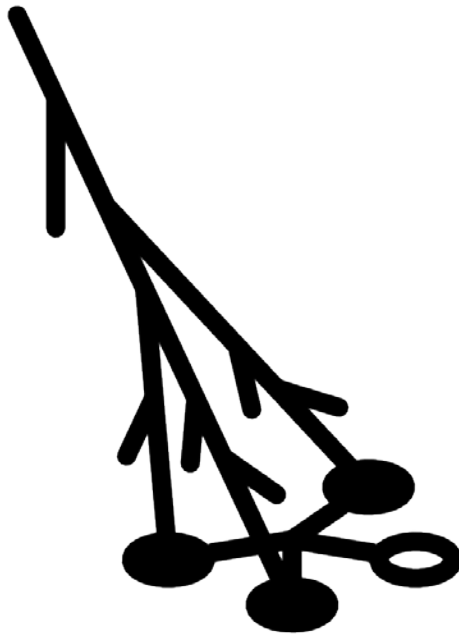


HiSPARC

High-School Project on Astrophysics Research with Cosmics

- **Physics**

Detection of cosmic-ray air showers on a large surface (~size of The Netherlands).



- **Educational**

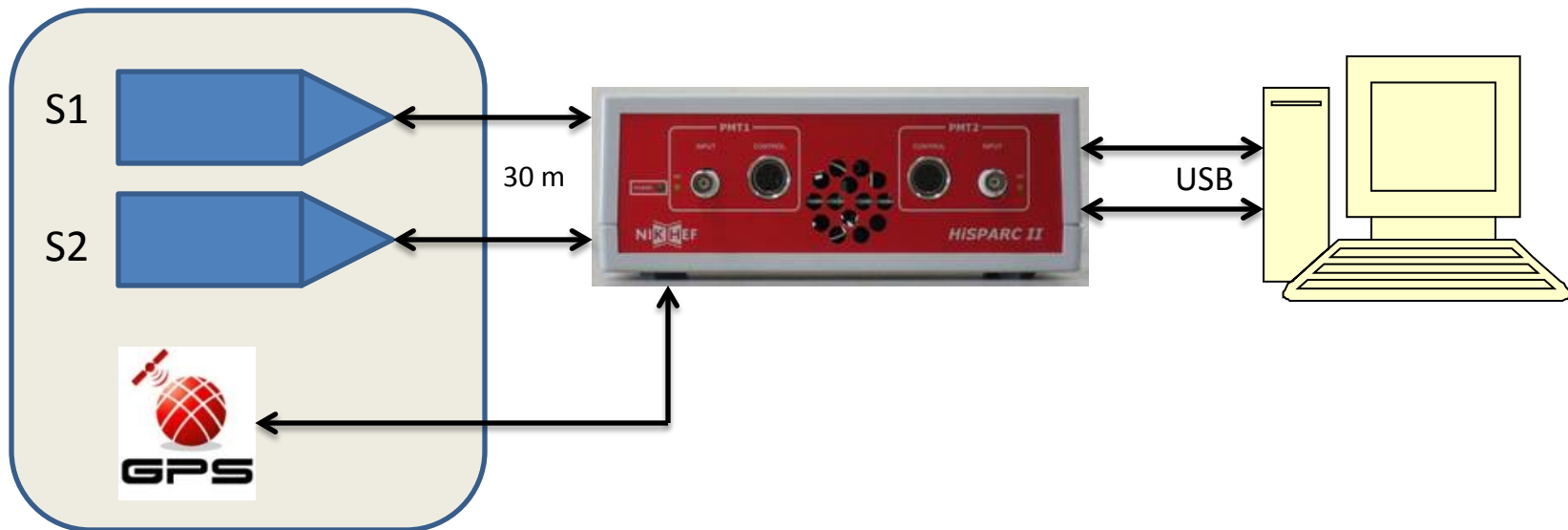
Students built their own detector and analyze the data.

VWO: 'Profielwerkstukken voor scholieren'



HiSPARC Detector

- 2 Scintillatoren
- 2 Fotoversterkerbuizen (PMT): 9125B (van ET Enterprises)
- GPS antenne (met voet)
- 2 Skiboxen
- 1 HiSPARC II Master met voeding (van Nikhef)
- Windows (XP/7) PC met toegang tot internet



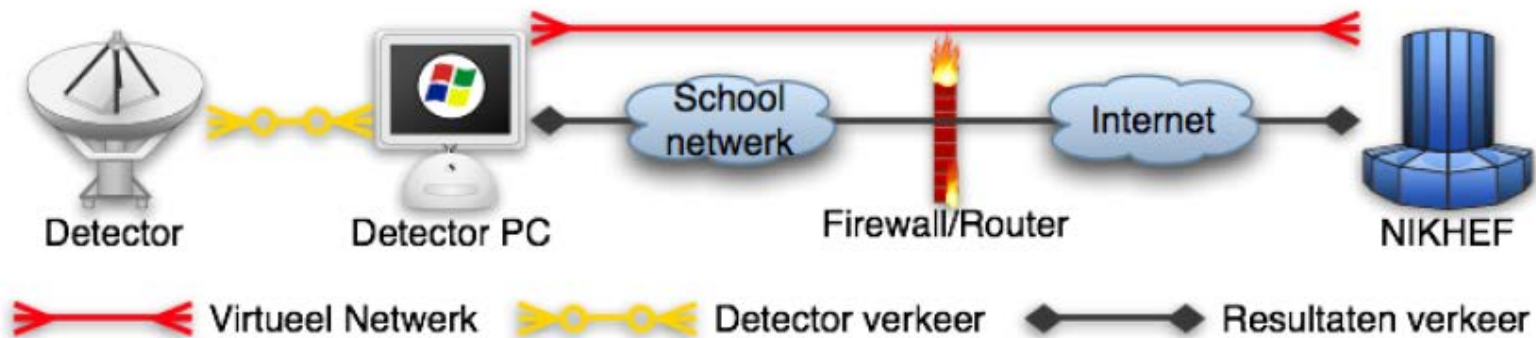
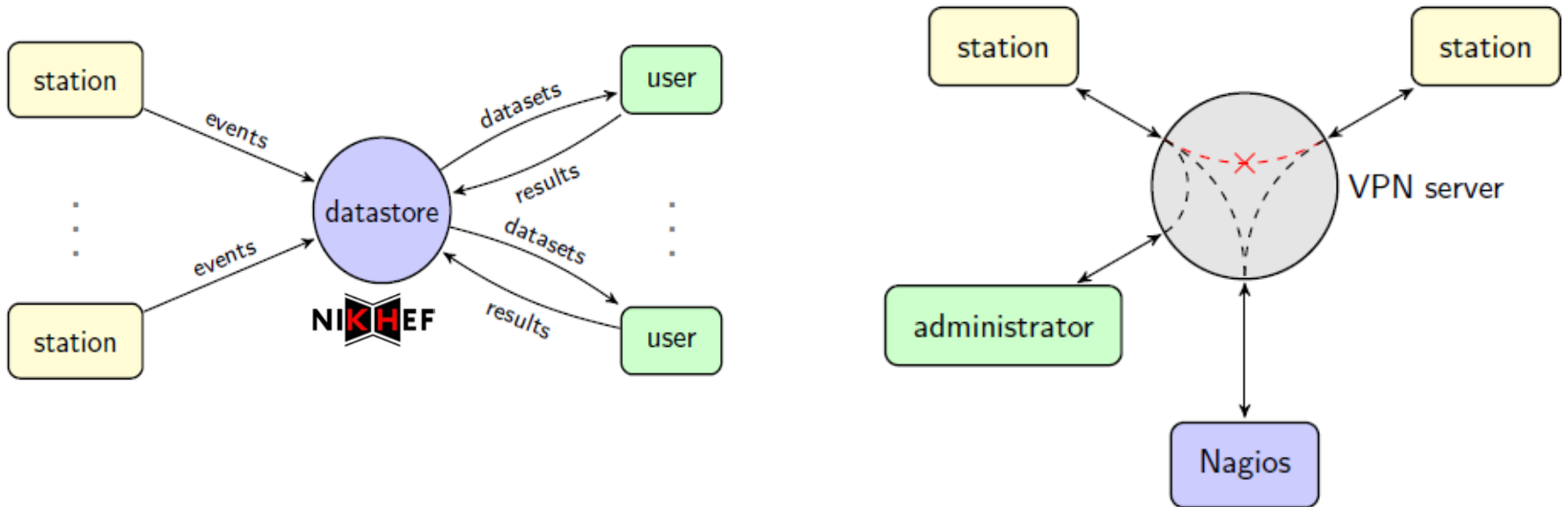
HiSPARC stations



NL:	94
GB:	3
DK:	3



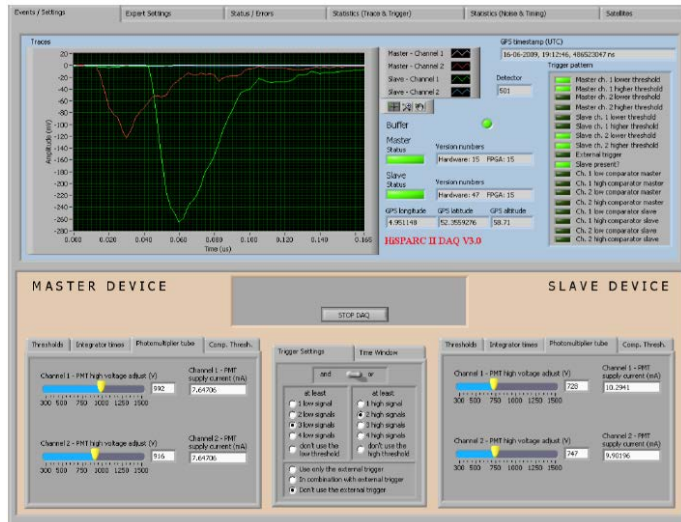
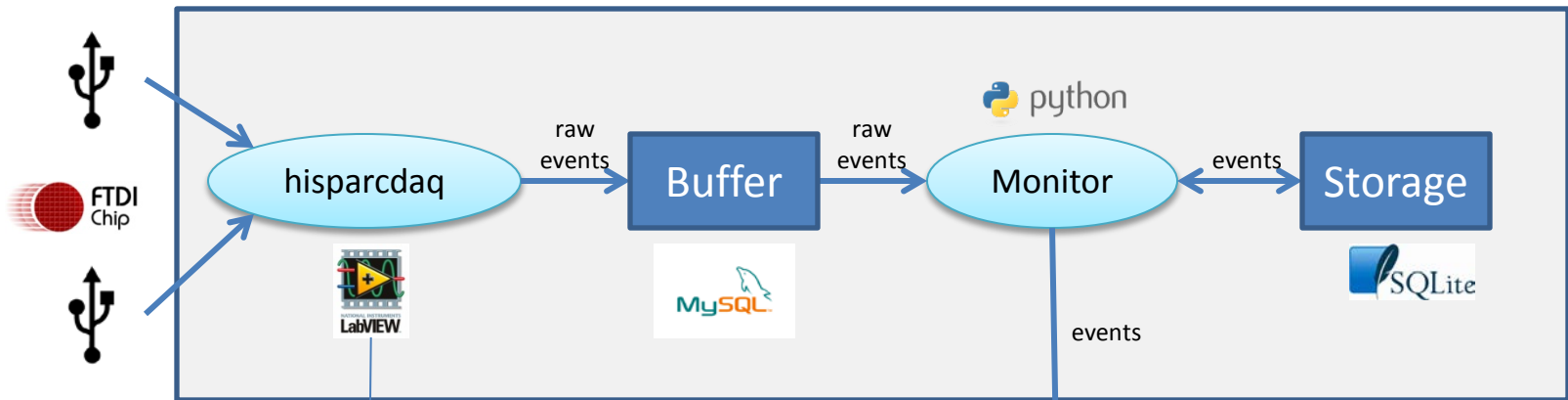
Readout and Control



Station-Software

Process and Dataflow

HiSPARC PC



Station Software (2)

Control and Monitoring

Services



The image shows three logos stacked vertically: Nagios, OPENVPN, and tightVNC.



The image shows the Python logo and the word 'python' above a blue oval containing the word 'Updater'.

Service Status Details For Host 'sciencepark501'

Host ↑↓	Service ↑↓	Status ↑↓	Last Check ↑↓	Duration ↑↓	Attempt ↑↓	Status Information
sciencepark501	Buffer size	OK	10-30-2011 22:54:32	7d 18h 47m 40s	1/3	Buffer DB contains 251 events
	CPU Load	OK	10-30-2011 22:57:57	7d 16h 44m 15s	1/3	CPU Load 47% (5 min average)
	Drive Space C:	OK	10-30-2011 22:57:22	7d 18h 44m 50s	1/3	c: - total: 232.88 Gb - used: 13.83 Gb (6%) - free 219.05 Gb (94%)
	EventRate <small>PASV ↓↓</small>	OK	10-31-2011 15:51:32	18d 13h 23m 2s	1/3	Event rate for a period of 61.14 seconds is 0.95
	LabviewUsage	OK	10-30-2011 22:54:22	7d 17h 37m 50s	1/3	Memory usage: 39.3 Mb
	Memory Usage	OK	10-30-2011 22:56:22	7d 16h 35m 50s	1/3	Memory usage: total:2440.90 Mb - used: 771.87 Mb (32%) - free: 1669.03 Mb (68%)
	StorageGrowth <small>PASV ↓↓</small>	OK	10-31-2011 15:51:33	25d 3h 3m 1s	1/3	Storage growth: -0.716667 Hz
	StorageSize <small>PASV ↓↓</small>	OK	10-31-2011 15:51:31	25d 3h 3m 3s	1/3	Storage size: 5 events
	TriggerRate <small>PASV ↓↓</small>	OK	10-31-2011 15:51:11	0d 1h 0m 33s	1/3	Trigger rate: 0.58 Last update: 6 seconds ago
	Uptime	OK	10-30-2011 22:57:43	7d 16h 34m 29s	1/3	System Uptime - 17 day(s) 20 hour(s) 32 minute(s)

Host Status Totals

Up	Down	Unreachable	Pending
77	22	0	0

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
729	1	0	260	0

Software

Organization and Engineering




admin:

- FTDI
- NI runtime engine
- ODBC
- Nagios
- OpenVPN
- TightVNC

user:

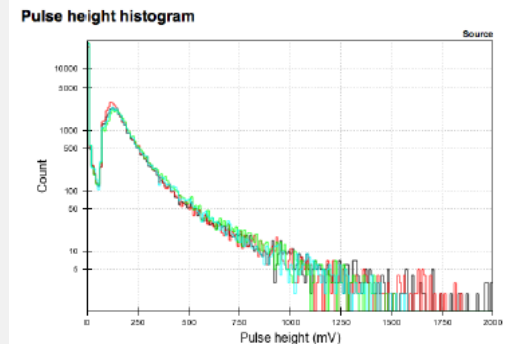
- hisparcdaq
- Python
- Monitor
- Updater
- MySQL
- DspMon
- Utilities

Supporting components:

- NSIS:  nullsoft scriptable install system
-  **github** SOCIAL CODING : cloud repository, based on git, a distributed version control system
-  **django** : a high-level Python Web framework

HiSPARC public database: <http://data.hisparc.nl/>

1. Administration of stations, password, certificates, contacts
2. Data quicklooks, histograms
3. Analysis results pages






HiSPARC Installer

Remarks:

- Goal: **ONE** installer containing the full functionality!
Including Python, monitoring services, NI runtime engine, etc...
No additional software is needed.
- Fixed installation path: 'C:\Program Files\HiSPARC' (contains everything)
- Installer consists of 3 parts, of which 2 are installers themselves
 - main*:
 - Administrator check, platform check (WXP, Windows 7, 32 bit)
 - Interactive part: station number, certificate, password
 - HiSPARC registry
 - Add users: *hisparc* and *admhisparc*
 - Auto logon feature with auto startup of hisparcdaq, Monitor and Updater
 - HiSPARC shortcuts inside 'All Programs'
 - admin*:
 - installation of the services and drivers (FTDI, ODBC, NI, Nagios, OpenVPN, TightVNC)
 - Set services to automatic and start them
 - Adjust **firewall** settings: port 5666, 5900, 12489 set open for OpenVPN and TightVNC
 - user*:
 - LabVIEW executables: *hisparcdaq*, *hisparcweather*,
 - Python
 - Python scripts for Monitor, Updater and Nagios functions

HiSPARC Installer (2)

Version:

Name	Date modified	Type	Size
 adminUpdater_v6.exe	24-Oct-12 10:38 AM	Application	106,390 KB
 hisparcInstaller_v6.11.2.exe	24-Oct-12 10:48 AM	Application	200,719 KB
 userUnpacker_v11.exe	24-Oct-12 10:46 AM	Application	93,813 KB

Uninstallers: each part has its own

Updater:

- scans for recent versions of admin and user installers
- if found, download
 - in case of *userUnpacker*:
 - stop the user software
 - execute new *userUnpacker* (files only)
 - restart user software
 - in case of *adminUpdater*
 - notification popup window (nothing more)

HiSPARC

Wrapup

Final remarks:

- Software development process: none
- Developed by (mostly) none-IT and temporarily people: students, trainees,
- Some design and implementation aspects are questionable.
- Dealing with high-schools is sometimes cumbersome.
- Nevertheless: it works!

Further information:

- <http://www.hisparc.nl/>
- The HiSPARC Experiment, thesis dr. David B.R.A. Fokkema, ISBN: 978-90-3653438-3