

# Curriculum Vitae

## Personal information

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*Name:* **Heijboer**  
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## Education and Employment

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*1994 – 1998:* M.Sc. in experimental physics at University of Amsterdam  
Thesis: *Dynamics and performance of the GRAIL detector.*  
*1999 – 2004:* Ph.D. student at Nikhef and University of Amsterdam  
Thesis: *Track reconstruction and point source searches with ANTARES.*  
Ph.D. received June 8, 2004.  
*2004 – May '08 :* Research Associate at the University of Pennsylvania, working at Fermilab on the CDF experiment at the Tevatron collider.  
*May '08 – Jan '09:* CERN Research Fellow , working on the Atlas experiment.  
*Feb '09 – present:* Researcher at Nikhef, working on ANTARES/KM3NeT.

## Fellowships and Awards

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- CERN Research Fellowship (awarded June 2007).
- NWO Vidi grant for the proposal '*Exploring the Cosmos with Neutrinos*'. (€ 600.000/5 years, awarded July 2008). The proposal can be viewed at [www.nikhef.nl/~t61/vidi](http://www.nikhef.nl/~t61/vidi).

## Scientific achievements

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### *In ANTARES*

- Developed a new method for the reconstruction of muon tracks in the ANTARES detector, improving both the detection efficiency (by nearly 100%) and the angular resolution. This is still the default method used by the collaboration.
- Developed a new method to conduct searches for astrophysical point-like sources of high energy muon-neutrinos using both directional and energy information. The method, which is based on an unbinned likelihood ratio test, improves the discovery potential by 40%.

- Contributed to the data acquisition software and developed the tools for monitoring optical activity in the ANTARES detector.
- Performed the first analysis of data obtained from a prototype detector (sector line) in the laboratory, measuring the time resolution of the detector.
- Author of a 3D ANTARES event display, which has frequently been used to produce images and movies for PR purposes.
- Reconstructed the first neutrino events observed with the partially completed (5-lines) ANTARES detector.

#### *In CDF*

- Responsible for the alignment of the silicon detector, which is crucial for a large part of the CDF physics program.
- Developed and implemented a new computational method for analysing data in the search for  $B_s$ -oscillations, speeding up the analysis by a factor 100. This breakthrough was crucial for evaluating the systematic uncertainty and for determining the statistical significance of the measurement.
- Responsible for combining the results from different  $B_s$  decays into a single, precise, measurement of  $B_s$  oscillations. Proposed the method for and performed the evaluation of the statistical significance of this measurement.
- Co-convener of the CDF B-Physics Analysis Kernel (BPAK) group, which is devoted to technical issues related to B-physics analysis; e.g. flavour tagging (Jan. 2006 - 2007).
- On-call technical expert for the operations of CDF Time-of-flight detector.
- Contributed to the 'Higgs Trigger task force', developing tools to evaluate trigger efficiency in order to optimise the Higgs discovery potential at CDF.
- Initiated and performed a search for the Standard Model Higgs Boson, produced in association with a W or Z boson decaying into jets. This channel was not yet used at Run II of the Tevatron and therefore adds new power to the combined Tevatron Higgs search. The analysis used a matrix element technique for optimal separation of signal and background. The result was approved by the collaboration in April 2008. A draft publication is undergoing internal review (CDF internal note 9669; to be submitted to Phys. Rev. Lett.).

#### *In Atlas*

- Developed part of the software infrastructure for offline monitoring of the Atlas trigger system. These tools allow for quick monitoring and analysis of the trigger performance.
- On-call expert for offline trigger operations during first weeks after first beam in LHC.

## Talks at Conferences, Workshops and Seminars

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- *Status of the ANTARES neutrino telescope*  
The 18<sup>th</sup> European Cosmic Ray Symposium, Moscow, July 2002
- *Muon Track Reconstruction and Point Source Searches with ANTARES.*  
International Workshop on Ultra High Energy Neutrino Telescopes, Chiba(Japan), July 2003
- *Point source searches with the ANTARES neutrino telescope.*  
The 28<sup>th</sup> International Cosmic Ray Conference, Tsukuba (Japan), August 2003
- *A method for reconstruction of muon tracks.*  
Workshop on Technical Aspects of a Very Large Volume Neutrino Telescope in the Mediterranean Sea, Amsterdam, October 2003.
- *Searching for Point Sources with ANTARES*  
Astrophysics seminar, University of Wisconsin, Madison, Oct 2005
- *$B_s$  oscillations at CDF*  
Physics seminar, Brookhaven National Laboratory, May 2006
- *$B_s$  oscillations at CDF*  
Experimental physics seminar, Cornell University, May 2006
- *$B_s$  oscillations at CDF*  
Colloquium, NIKHEF, Amsterdam, July 2006
- *Alignment experience at CDF*  
First LHC alignment workshop, CERN, Geneva, September 2006, (invited speaker)
- *Observation of  $B_s$  oscillations at CDF*  
Experimental seminar, SLAC, Dec 2006
- *The Observation of  $B_s$  oscillations*  
Seminar, Nikhef, Amsterdam, January 2007
- *$B_s$  oscillations,  $\Delta\Gamma_s$ ,  $\phi_s$ , and the discovery of  $\Sigma_b^{(*)}$ .*  
The 42<sup>nd</sup> Rencontres de Moriond, Electroweak Session, March 2007
- *The observation of  $B_s$  oscillations.*  
Joint Astro/HEP seminar, University of Wisconsin, Madison, April 2007
- *Higgs Searches at the Tevatron*  
International Symposium on Multiparticle Dynamics, Desy, Hamburg, September 2008

## Selected Publications

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- “Point source searches with the ANTARES neutrino telescope”  
A. Heijboer, on behalf of the ANTARES Collaboration.  
Proceedings of 28<sup>th</sup> International Cosmic Ray Conferences (ICRC 2003), Tsukuba, Japan, 31 Jul - 7 Aug 2003.
- “Measurement of the  $B_s^0 - \bar{B}_s^0$  oscillation frequency”  
A. Abulencia *et al.* [CDF Collaboration]  
Phys. Rev. Lett. **97**, 062003 (2006)
- “Observation of  $B_s^0 - \bar{B}_s^0$  oscillations”  
A. Abulencia *et al.* [CDF Collaboration]  
Phys. Rev. Lett. **97**, 242003 (2006)
- “Tevatron results on the discovery of  $\Sigma_b^{(*)}$ ,  $B_s$  oscillations, the lifetime difference  $\Delta\Gamma_s$  and the  $cp$ -violating phase  $\phi$ .”  
A. Heijboer, for the CDF and D0 collaborations,  
Proceedings of the 42<sup>nd</sup> Rencontres de Moriond (EW).

### In Preparation:

- “A Search for the Associated production of the Standard Model Higgs Boson in the all-hadronic channel.”  
CDF Collaboration, To be submitted to Phys. Rev. Lett. (cdf note 9669)

## Other Activities

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- Teaching assistant for courses on special relativity and computer programming at the University of Amsterdam (1999-2001).
- Internal reviewer (‘Godparent’) for several CDF publications on B-physics and Higgs searches (2007-2009)
- Reviewer for NIM-A. (2008)
- Talk for the general public: ‘LHC en de Kosmos’, Jan 2009, Stichting J.C. Van der Meulen, Hoorn.

## Schools

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- School and Workshop on Neutrino Particle Astrophysics, Les Houches (France), January 2002.
- The 12th Joint (Belgian, Dutch, German) Graduate School of Particle Physics, Monschau (Germany), September 2000.
- The 11th Joint (Belgian, Dutch, German) Graduate School of Particle Physics, Kerkrade (The Netherlands), September 1999.