VENUS KEUS

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Dear Sir/Madam

I am writing to express my interest to apply for the Postdoc position in your group.

I finished my PhD studies at University of Liege in September 2012. My research focus has been on the scalar sector of mutli-Higgs-doublet models, and the phenomenological implications of the possible symmetries imposed on the scalar potential.

After my PhD, I have started working as a visiting researcher at the University of Southampton, working on the Exceptional Supersymmetric Standard Model. Having built a strong background in Group Theory, I am studying dark matter candidates in the inert scalar sector in ESSM.

My references are:

Dr. Igor Ivanov <Igor.Ivanov@ulg.ac.be> +32 4 366 3784

Prof. Jean-Rene Cudell <JR.Cudell@ulg.ac.be> +32 4 366 3654

Dr. Pedro Ferreira <ferreira@cii.fc.ul.pt > +35 1218 317 135

Prof. Maria Krawczyk <maria.krawczyk@fuw.edu.pl> +48 22 55 32 309

I am very ambitious, motivated and effective, and I really enjoy working in a team.

I have attached a copy of my CV and research interest to my portfolio. Please do not hesitate to contact me for further information.

Thank you for considering me for the position.

Best regards,

Venus Keus

CURRICULUM VITAE

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DATE OF BIRTH: 22 June 1983
NATIONALITY: Iranian

EDUCATION

PhD: Theoretical High Energy Physics, 2009- 2012, **University of Liege**, Liege, Belgium

M.Sc.: Erasmus Mundus Master of Nano-science and Nano-technology

Major; Nano-science, 2007- 2008, **Chalmers University of Technology**, Gothenburg, Sweden

Minor; Bio-nanotechnology, 2006-2007, **Delft University of Technology**, Delft, Netherlands

B.Sc.: Physics, 2001- 2006, **Amirkabir University of Technology**, Tehran, Iran.

ACADEMIC CAREER

- IISN researcher, IFPA, University of Liege, Belgium (February 2009-present).
- Visiting researcher, SHEP, University of Southampton, United Kingdom (September 2012-present).
- Erasmus Mundus Master of Nanoscience and Nanotechnology scholarship holder, TUDelft, Netherlands/ Chalmers University, Sweden (2006 – 2008).

RESEARCH INTERESTS

Beyond standard model physics, Multi-Higgs-doublet models, Dark matter phenomenology, SUSY, ESSM

COMPUTER SKILLS

- Operating systems: Linux (Ubuntu), Microsoft Windows.
- Data analysis: Mathematica, Matlab.
- Programming languages: Fortran, LATEX.

PUBLICATIONS

1. "Frustrated symmetries in multi-Higgs-doublet models", Igor P. Ivanov, Venus Keus, [Physics Letters B (2011), 695(5), 459-462]
2. "Abelian symmetries in multi-Higgs-doublet models", Igor P. Ivanov, Venus Keus, Evgeny Vdovin, [J. Phys. A: Math. Theor. 45 (2012) 215201]
3. "Z_p scalar dark matter from multi-Higgs-doublet models", Igor P. Ivanov, Venus Keus, [Phys. Rev. D86 (2012) 016004]
4. "Abelian symmetries in NHDM", Venus Keus, Proceedings of the "Rencontres de Moriond" conference, March 2012, [arXiv:1205.2792v1 [hep-ph]]
5. "Symmetries of the Scalar Sector of Multi-Higgs-Doublet Models", Venus Keus, [arXiv:1208.3867 [hep-ph]]
6. "Geometric minimization of highly symmetric potentials" Audrey Degee, Igor P. Ivanov, Venus Keus, [arXiv:1211.4989 [hep-ph]]

INVITED TALKS

- NExT Meeting, November 2012, Royal Holloway University of London, UK.
- Workshop on Multi-Higgs Models, August 2012, Lisbon, Portugal.
- University of Warsaw, Faculty of Physics, May 2012, Warsaw, Poland.
- University of Southampton, SHEP, May 2012, Southampton, UK.
- Rencontres de Moriond, March 2012, La Thuile, Italy.
- Faculdade de Ciências da Universidade de Lisboa, November 2011, Lisbon, Portugal.
- Scalars 2011, August 2011, Warsaw, Poland.
- Journee des doctorants PandA, June 2011, Brussels, Belgium.
- IFPA Internal seminar, May 2011, Liege, Belgium.
- IFPA Internal seminar, November 2010, Liege, Belgium.
- Journee des doctorants, September 2010, Liege, Belgium.

SCHOOLS

- "38th ITEP Winter school of Physics", February 2010, Moscow, Russia.
- Summer school: "Gearing up for LHC Physics" - August 2010, Zuoz, Switzerland.

STATEMENT OF RESEARCH INTEREST

VENUS KEUS

My field of research consists of the scalar sector beyond the Standard Model, in particular N-Higgs-doublet models (NHDM). One of the main motivations in introducing several Higgs doublets is that several symmetry groups, especially the finite ones, can be implemented in the model and provide insights on the structure of the Fermion mass matrices, and dark matter candidates.

During my PhD, I focused on classification of symmetries of the NHDM potential, after developing complicated Group Theoretical methods. We have developed an algorithmic strategy that gives full list of possible realizable Abelian symmetries, both unitary and generalized CP, for any given N. We have also introduced a geometric method for minimizing highly symmetric scalar potentials which is often much more efficient than the usual method. Using this method we have found symmetric 3HDMs, which interestingly have the same mass spectrum as 2HDM. I would like to explore how these situations can be distinguished from the true 2HDM experimentally, and which observable quantities one should look at.

I am very interested in following this line of research and investigating the phenomenological consequences of the symmetries found in NHDM. This includes, in particular, a study of how and when the symmetries of the potential are broken, and what is the effect of these symmetries on the physical Higgs boson spectrum. One intriguing possibility is that symmetry-constrained multi-doublet models can naturally contain scalar dark matter candidates.

After my PhD, I have tried to expand my views exploring possible models for physics beyond the Standard Model. Currently I am working on the scalar sector in the Exceptional Supersymmetric Standard Model (ESSM), a string theory inspired supersymmetric extension of the Standard Model with an E_6 grand unification group.

This model is based on the G_{SM} X U(1) gauge group containing an extra Z' boson corresponding to the extra U(1) group (under which the right-handed neutrinos have zero charge), the matter content corresponding to three 27 representations of the E_6 group (ensuring gauge anomaly cancelation), and an additional pair of Higgs-like doublets (providing high energy gauge coupling unification).

As an alternative to MSSM, this model provides a solution to the hierarchy problem and explains the neutrino mass. With a background in models with several Higgs doublets, I am very interested in studying electroweak symmetry breaking and Higgs phenomenology in the inert scalar sector in ESSM and explore dark matter candidates in this model.