

Simon Klüttermann

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Grappa

Science Park 904
Amsterdam 1098XH

January 7, 2021

Dear Dr. Weniger,

i am currently looking for a PHD position, and the one you advertise here might be the most interesting I have seen yet. The thing that might fascinate me the most, is the idea of a young group with many computer skilled members of similar work. And working this way, while still satisfying my interest makes me very much interested!.

Using the knowledge and skills I have acquired in my master studies combined with my technical abilities I believe I can provide significant value to your research while providing me invaluable experience to prepare me for my future career. Even though I have been fascinated by dark matter searches for a long time, I think my more important skill lies in the machine learning part of your job offer, and the bias-less searches this can provide. In own projects, my coursework and my theses, I have applied knowledge of machine learning and especially anomaly detection to finding new physics symptoms. Next to my familiarity with tensorflow and keras, I also have experience with genetic programming and statistics. A more complete list of my interests can be seen in my CV. Combining these tools with my physical background, I hope to be able to help your group answering some interesting questions.

Thank you for reading my cover letter and for considering me for this position.

Sincerely,



Simon Klüttermann

(SIGNATURE NEEDS TIME TILL ABOUT THE WEEKEND....)

Research interests

of Simon Kluettermann (PhD applicant)

Past research: I wrote my [masters thesis](#) about a modification of [this](#) Paper. There idea, was to use machine learning, namely anomaly detection, to unsupervisedly detect LHC jets that are not (only) the product of standart model interactions. My initial task, was to apply graph machine learning to the same task and see if this improves the quality. And even though this is not such an easy task, it became clear that the true problem lies in their initial approach. To find anomalous jet events, they used autoencoder. Sadly their desire of finding any anomalous event was only tested on limited anomalies, which resulted in them beeing great at finding this anomaly, but sadly not very good at every other one. After I found this, my master thesis kind of pivoted, making me focuss more on generality then on quality. Even though I had to use other algorithms than autoencoders to make this work, my final models are very general, and able to detect neirly any anomaly (there is a nice comparison plot at the end of my [thesis defence](#)).

Future interests: My future interestests are strongly influenced by my thesis. On the machine learning side, this means that I have a strong interest in understanding my models on a deeper level (and a sligth bias to thinking that machine learning models are less powerful and complicated than they seem), while on a scientific level I think it is sad, that good anomaly detection is a bit neglected, as there are only few fields were it could not be applied. Dark Matter searches are a prime example of a field that could profit from good anomaly detection. Instead of searching for expected results, anomaly detection can search for anything unexplainable. This can make it hard to differentiate between sources of these anomalies, but also allows you to make connections that could not be done by a human. On a more philosophical level I am faszinated by this idea. The concept of things that cannot be found by a human biases, but could be found by a machine. Finally some other things that I was/am interested in, you find in my [github](#) and I definitely do not just want to do things that I am familiar with already.

Referees

- Prof. Dr. Michael Krämer: mkraemer@physik.rwth-aachen.de
- Dr. Alexander Mück: mueck@physik.rwth-aachen.de

CV Simon Klüttermann

I strongly suggest not reading this here, since this is just a port of my better (online) CV, which you find at <http://www.psorus.de/s/cv.html>

timeline	
	1997
born in mönchengladbach	
	2015
finished school (franz meyers gymnasium)	
	later that year
started studying physics (@RWTH university)	
	2018
finished bachelor studies	
see Thesis abstract or Thesis download aswell as my Grades	
	2020
finished master studies	
see Thesis abstract or Thesis download aswell as my Grades	
	final grades
depending on my master thesis somewhere between 1.4 and 2.6 (more)	

programming languages	
	python
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	visual basic
<div><div></div><div></div><div></div></div> More...	
	c++
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	solidity
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	php
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	javascript
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	html/css
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languages	
	german
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	english
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	physics
see grades	
	machine learning
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	tensorflow
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	keras
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	automatisation
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	anomaly detection
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	statistics
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	web scraping
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	cryptography
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	blockchain
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	web development
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	sympy
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	graph theory
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	opengl
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	flask
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	microcontroller programming
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	vim
<div><div></div><div></div><div></div></div>	
	numpy
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	matplotlib
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	bash
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	latex
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	scipy
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