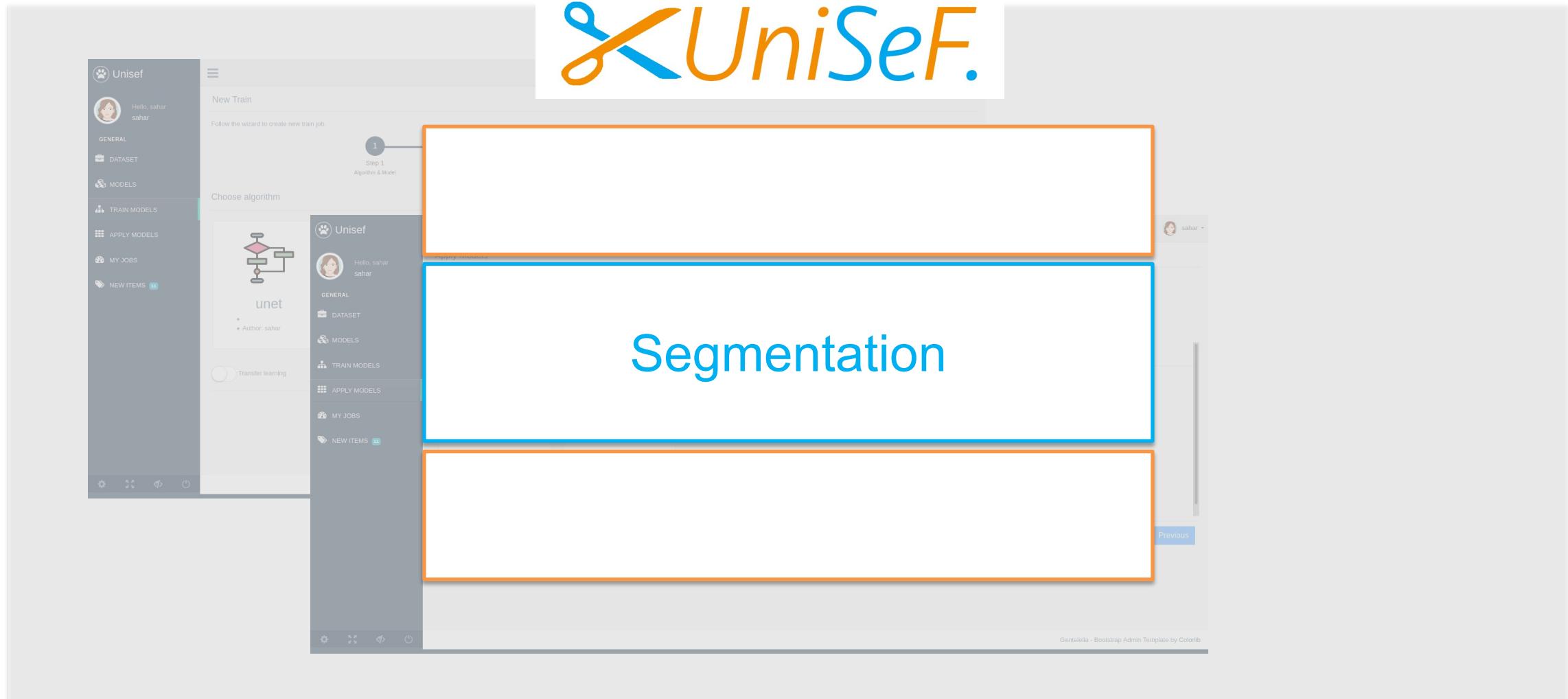


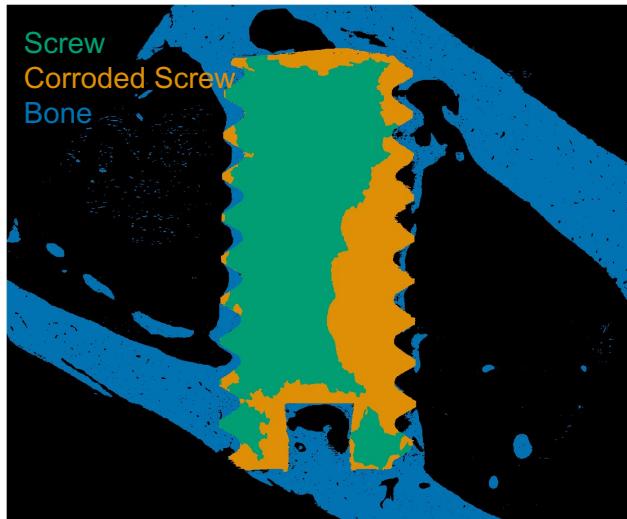
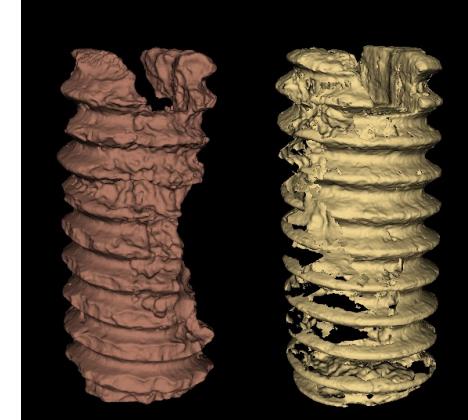
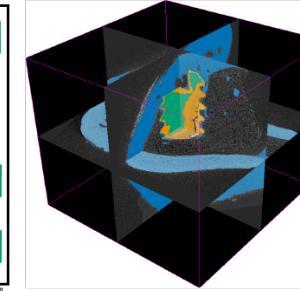
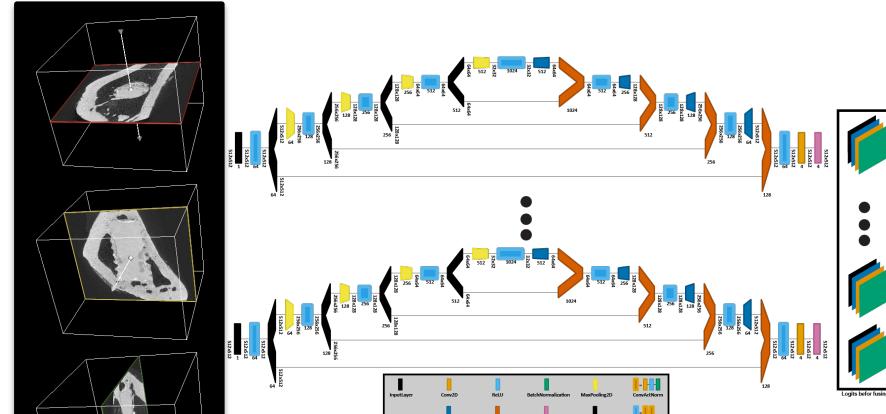
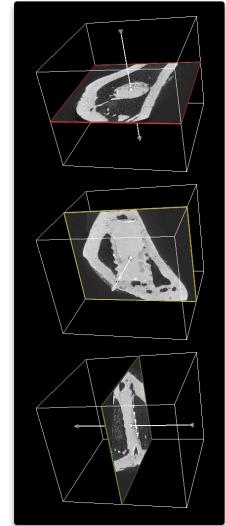
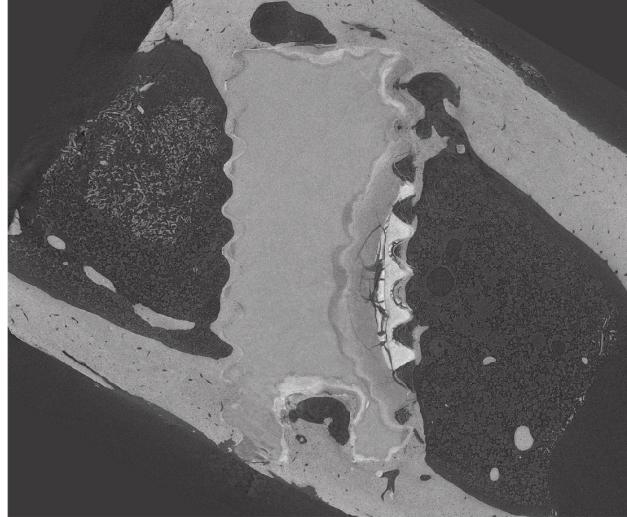
Deep Learning for Helmholtz Imaging at DESY IT

Philipp Heuser

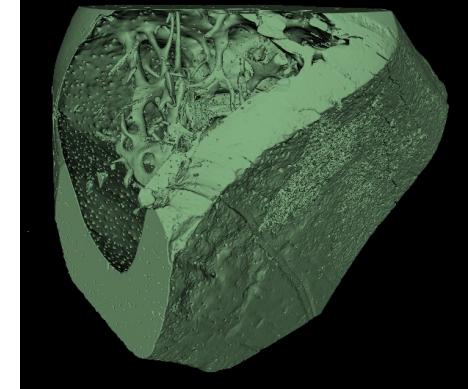
David Schwarz, Franz Rhee, Ivo Baltruschat, Sahar Kakavand



The screenshot shows the UniSeF web application interface. On the left is a sidebar with user information (Hello, sahar sahar), sections for GENERAL, DATASET, MODELS, TRAIN MODELS, APPLY MODELS, MY JOBS, and NEW ITEMS (with 11 items). The main area is titled "New Train" with the subtitle "Follow the wizard to create new train job." It shows "Step 1 Algorithm & Model" and a "Choose algorithm" section where "unet" is selected. A large orange box highlights the "unet" entry. Below this, a blue box highlights the word "Segmentation". Another orange box highlights the "Previous" button at the bottom right of the main panel. The footer of the page reads "Gentelella - Bootstrap Admin Template by Colorlib".

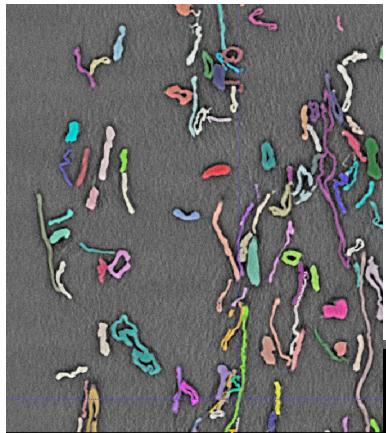


Optimised and scaled U-Net for the semantic segmentation of SRμCT data



Scaling the U-net: Segmentation of biodegradable bone implants in high resolution synchrotron microtomograms
IM Baltruschat, H Slominska, D Krüger, B Zeller-Plumhoff, R Willumeit-Römer, J Moosmann, P Heuser, Scientific Reports 2021 accepted

Segmentation

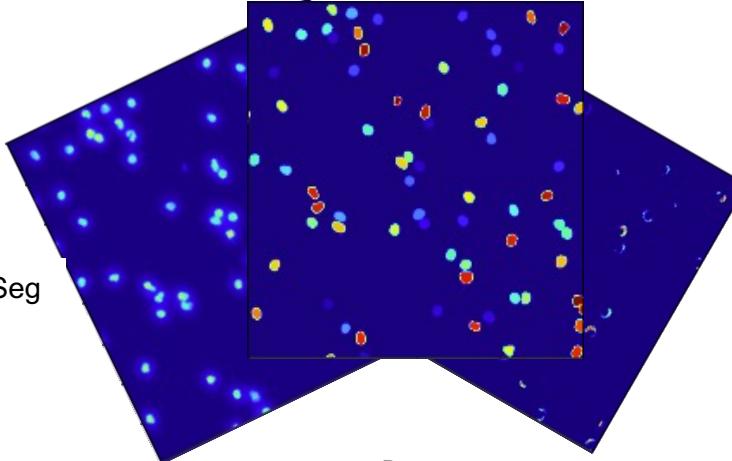
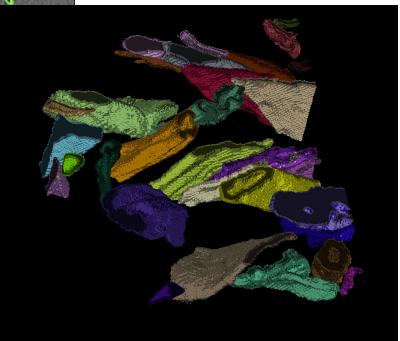


Instance segmentation of paper fibres in 3D SR μ CT tomograms



E M B E D S E G

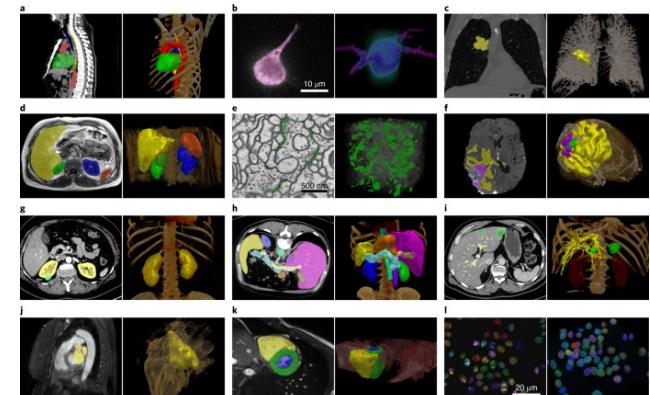
<https://github.com/juglab/EmbedSeg>
Lalit et al. 2021



<https://github.com/stardist/stardist>
Weigert et al. 2020

nnUnet

Isensee, F., Jaeger, P. F., Kohl, S. A., Petersen, J., & Maier-Hein, K. H. (2020). nnU-Net: a self-configuring method for deep learning-based biomedical image segmentation. *Nature Methods*, 1–9.



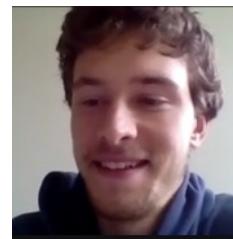
HIP | HELMHOLTZ IMAGING PLATFORM



The screenshot shows the UniSeF web application interface. On the left, there's a sidebar with user profiles (Unisef, sahar) and navigation options (GENERAL, DATASET, MODELS, TRAIN MODELS, APPLY MODELS, MY JOBS). A video feed of a woman (Sahar Kakavand) is displayed. The main content area has three large, overlapping boxes with orange borders:

- Active Learning** (orange box)
- Segmentation ✓** (blue box)
- Confidence/Uncertainty** (orange box)

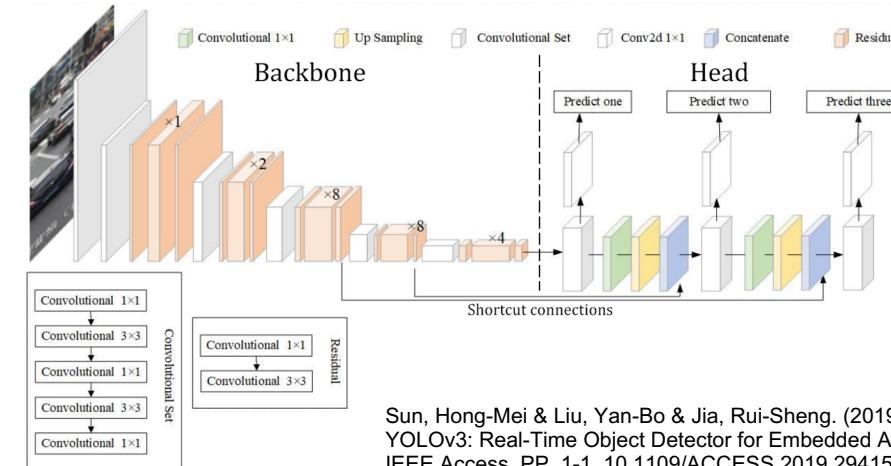
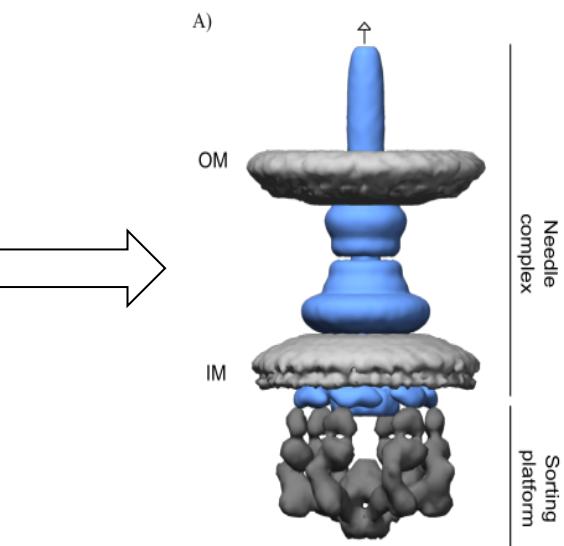
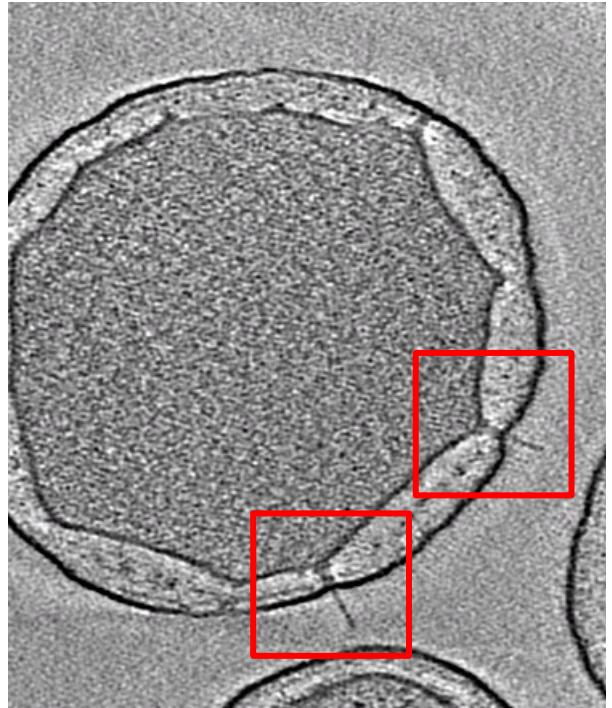
On the right side, there are two more video feeds: one of a man (Bashir Kazimi) and another of a man (Ivo Baltruschat). Arrows point from the text labels "Active Learning", "Segmentation", and "Confidence/Uncertainty" to their respective boxes in the center. The bottom right corner of the slide features the HIP logo.



PickYOLO

A deeplearning detector for particle picking in CryoET

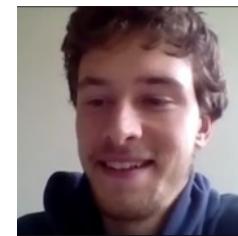
Erik Genthe



Sun, Hong-Mei & Liu, Yan-Bo & Jia, Rui-Sheng. (2019). Mini-YOLOv3: Real-Time Object Detector for Embedded Applications. IEEE Access. PP. 1-1. 10.1109/ACCESS.2019.2941547.

Paramter	Wert	Hinweis
Backbone	Darknet21	
Optimizer	SGD + Mom.	
Learningrate	0.00026	
Momentum	0.9	
Weight Decay	0.0006	
Batchsize	16	
Faktor für FN	4.0	
Epochen	60	
Höhe & Breite der Boxen	32 px	
Tiefe der Boxen	11 px	
min predictions (Clustering)	23	Dynamisch Optimiert
eps (Clustering)	7.0	Dynamisch Optimiert
Tiefe der Don't Care Zonen	16 px	Automatisch gesetzt

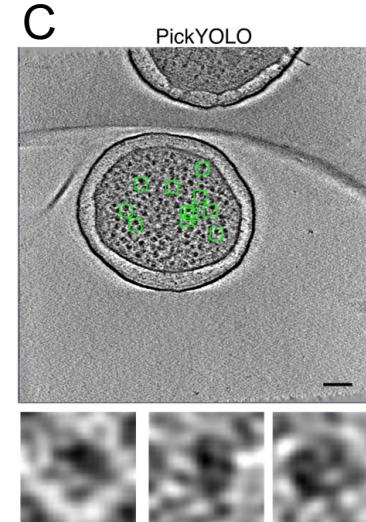
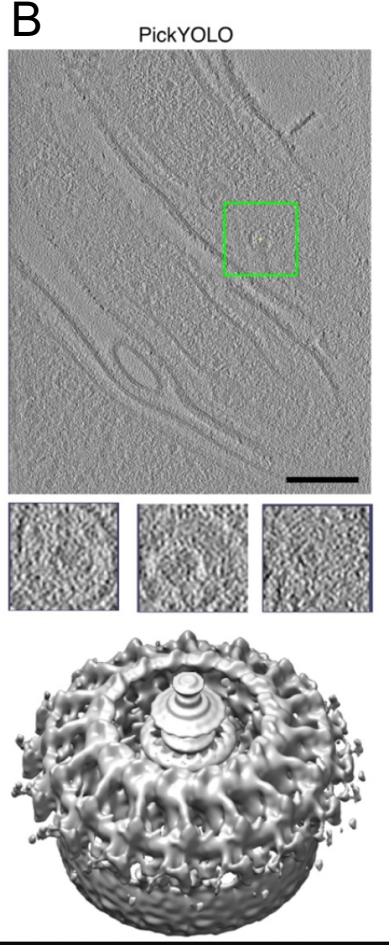
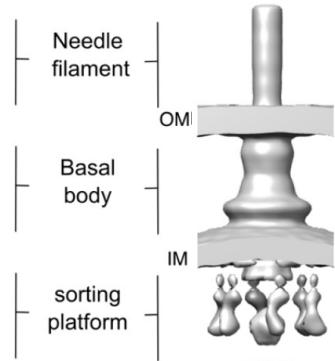
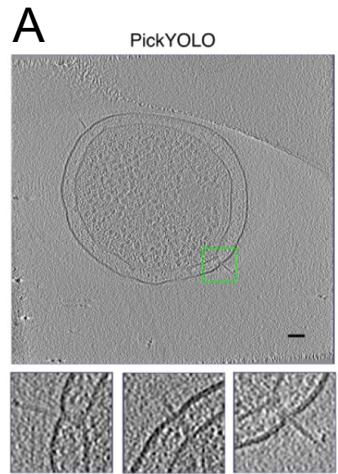




PickYOLO

A deeplearning detector for particle picking in CryoET

Erik Genthe



- A) T3SS membrane complexes in *Salmonella* minicells**
- B) flagellar membrane complexes in *Borrelia burgdorferi***
- C) cytoplasmic ribosome complexes in *Salmonella* minicells**

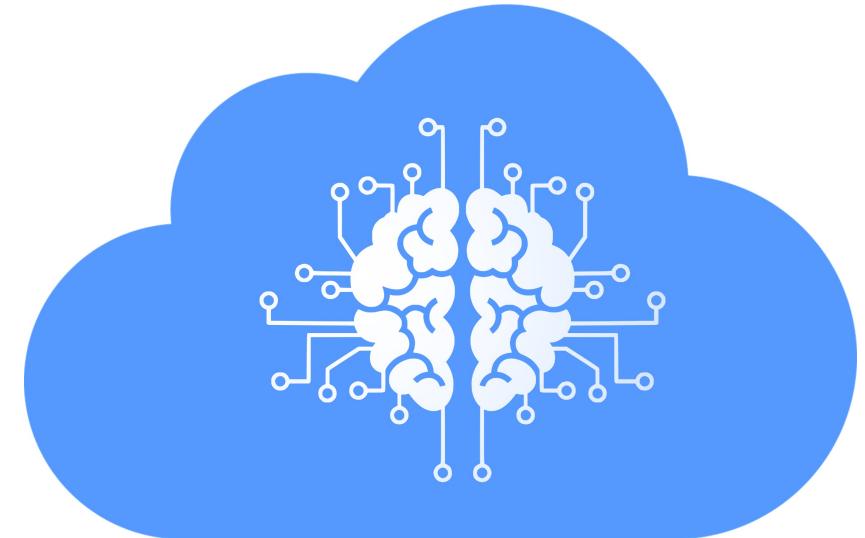
Erik Genthe, Sean Miletic, Tom Marlovits,
Philipp Heuser
**PickYOLO: Deep learning particle detector
for annotation of cryo electron tomograms;
almost done**



UniSeF / PickYolo / AI

as a service?

- How can DL be made available/usable to the non-expert?
- AI in the cloud
- Can we do this using DESY infrastructure?
 - maxwell
 - open stack / kubernetes





"Research and Innovation in
Scientific Computing"
RIC Group / DESY IT

Ivo Baltruschat
Semantic Segmentation
Uncertainty in ML
MDLMA

Franz Rhee
HIP

Sahar Kakavand
UniSef
Instance Segmentation



Erik Genthe
PickYolo

David Schwartz
HIP

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Johannes Replin

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COOPERATION UNIT

