

# Latent space out-of-distribution detection of galaxies for deblending in weak lensing surveys

Jelle Mes<sup>1,\*</sup>

Supervisors:

Elena Sellentin<sup>1,2</sup>, Koen Kuijken<sup>1</sup>

ML-IAP/CCA-2023

<sup>1</sup>Leiden Observatory, Leiden University, The Netherlands

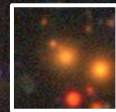
<sup>2</sup>Mathematical Institute, Leiden University, The Netherlands

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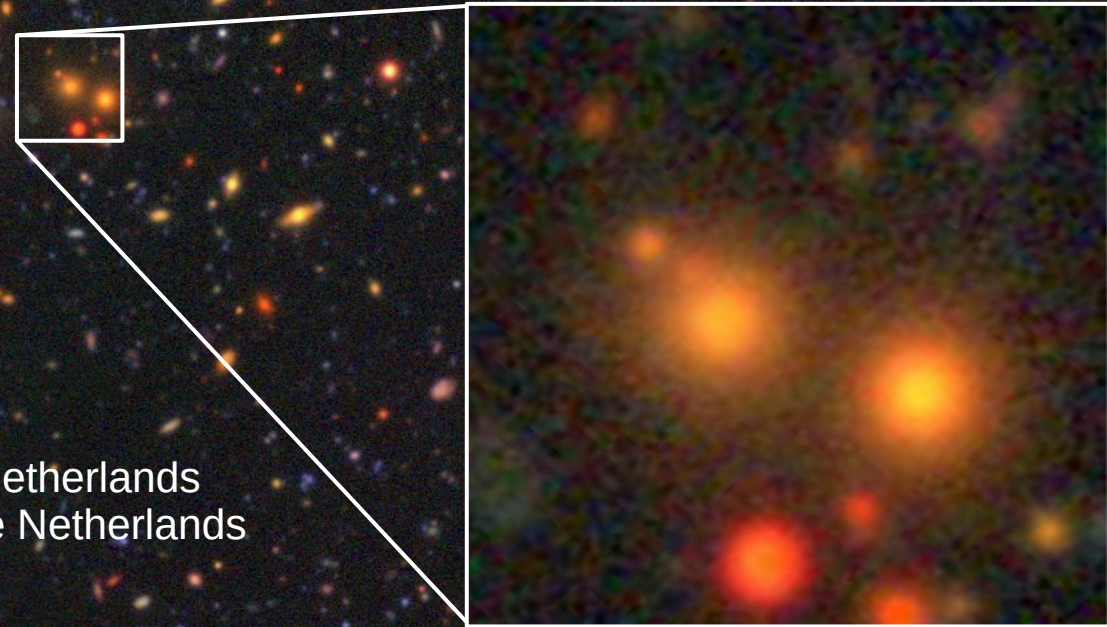


Image: Subaru/HSC

# Blending: a major issue for weak lensing

SDSS & Robert Lupton, Galaxy Zoo,  
cleveland.com, Dawson+2014

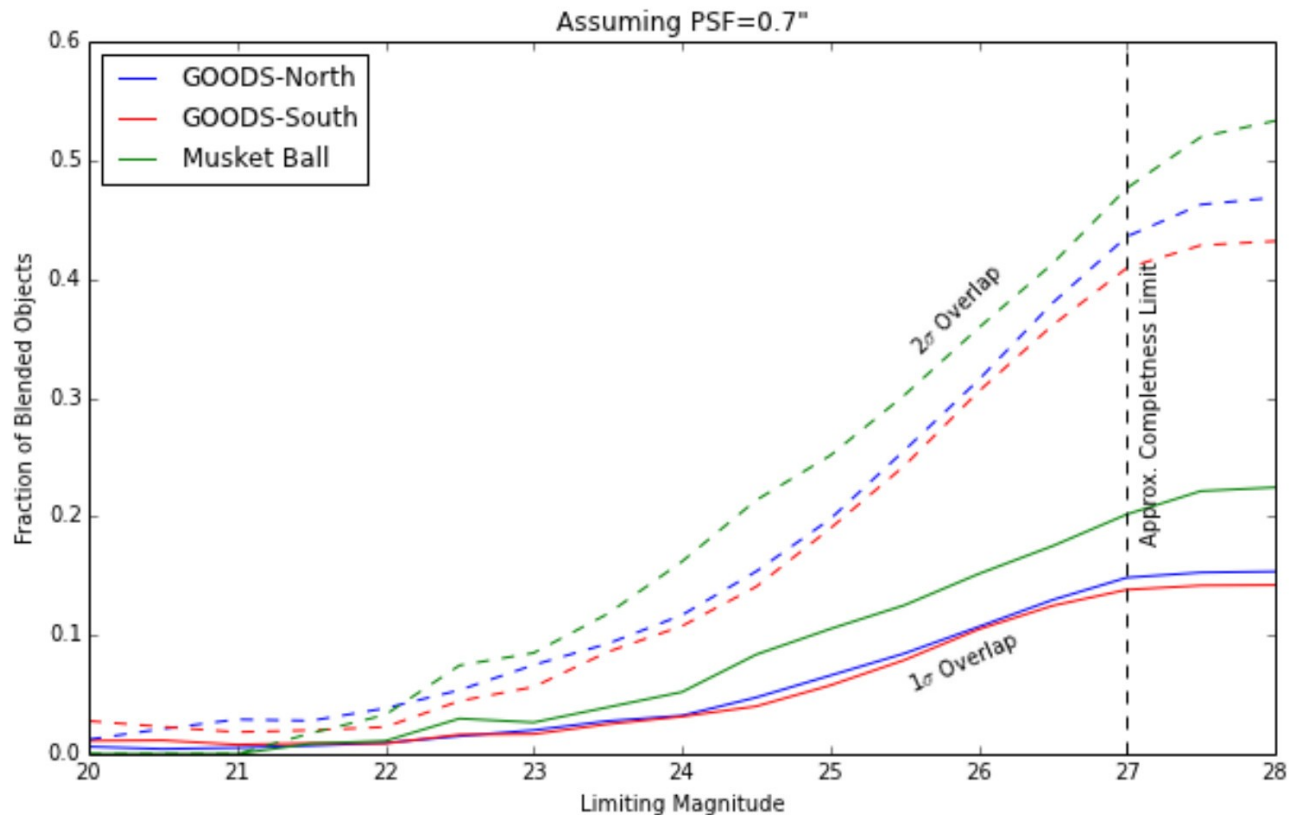


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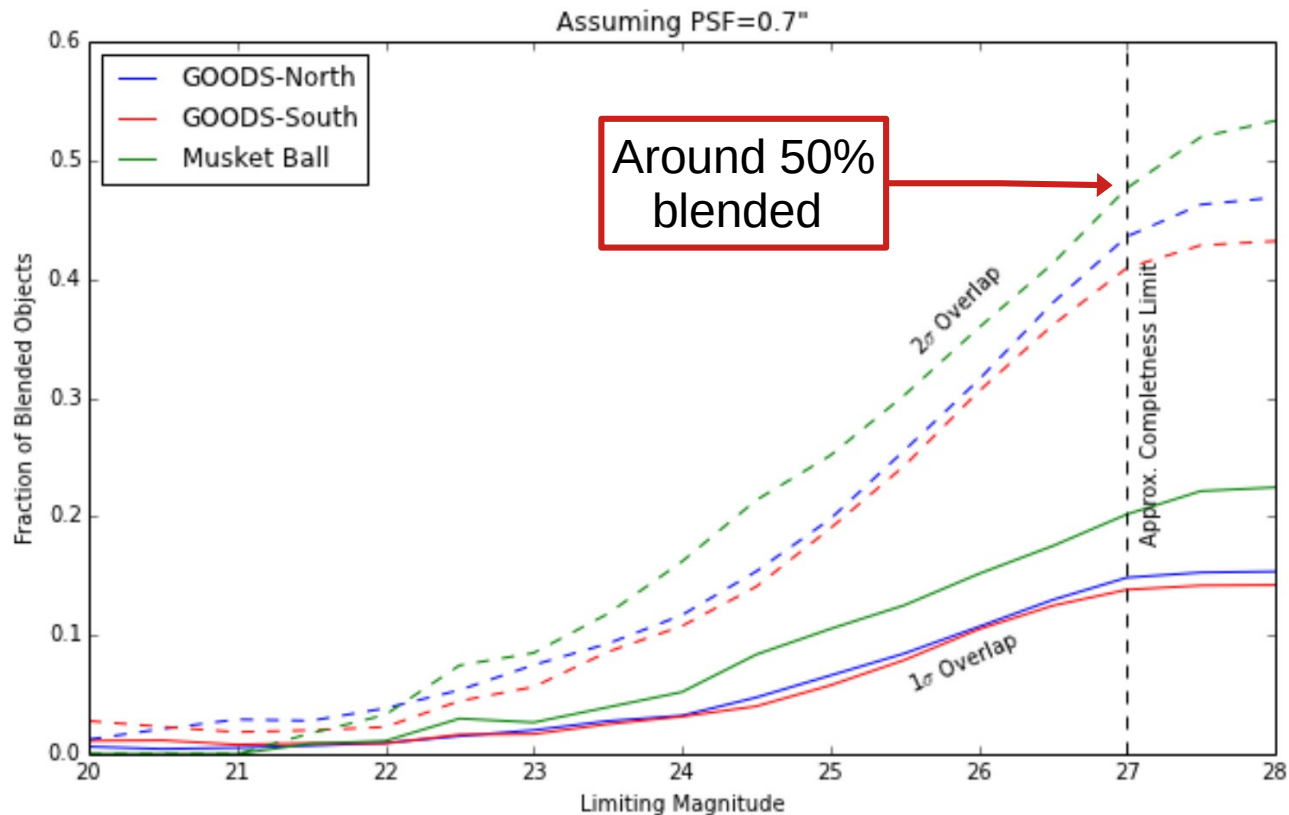
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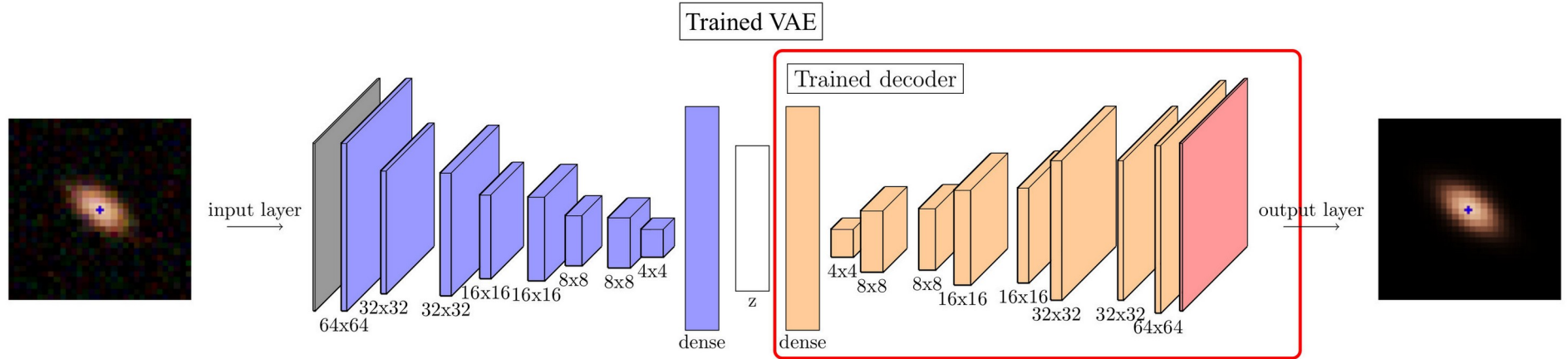
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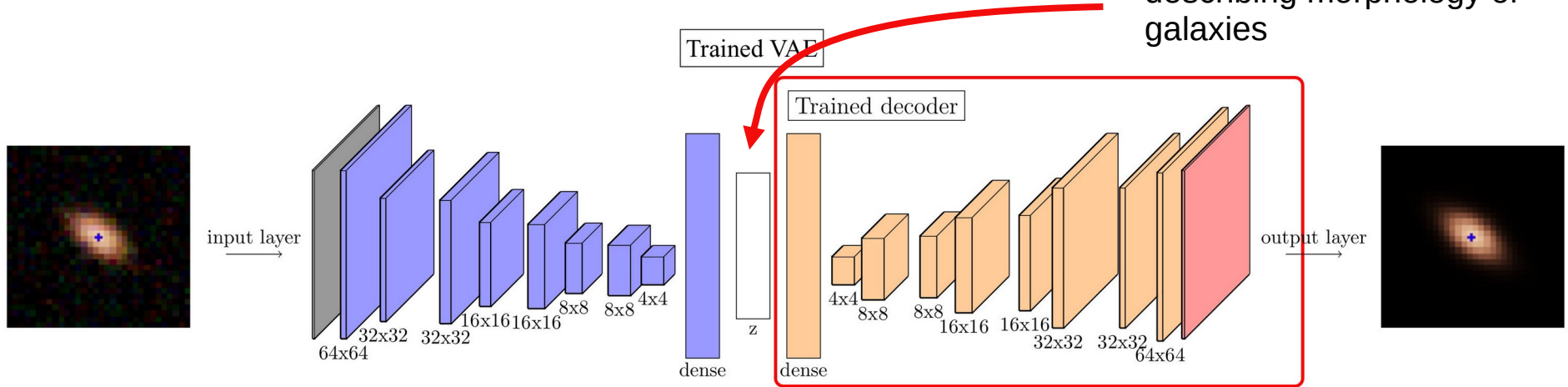
# Existing deblending method: $\beta$ -VAE





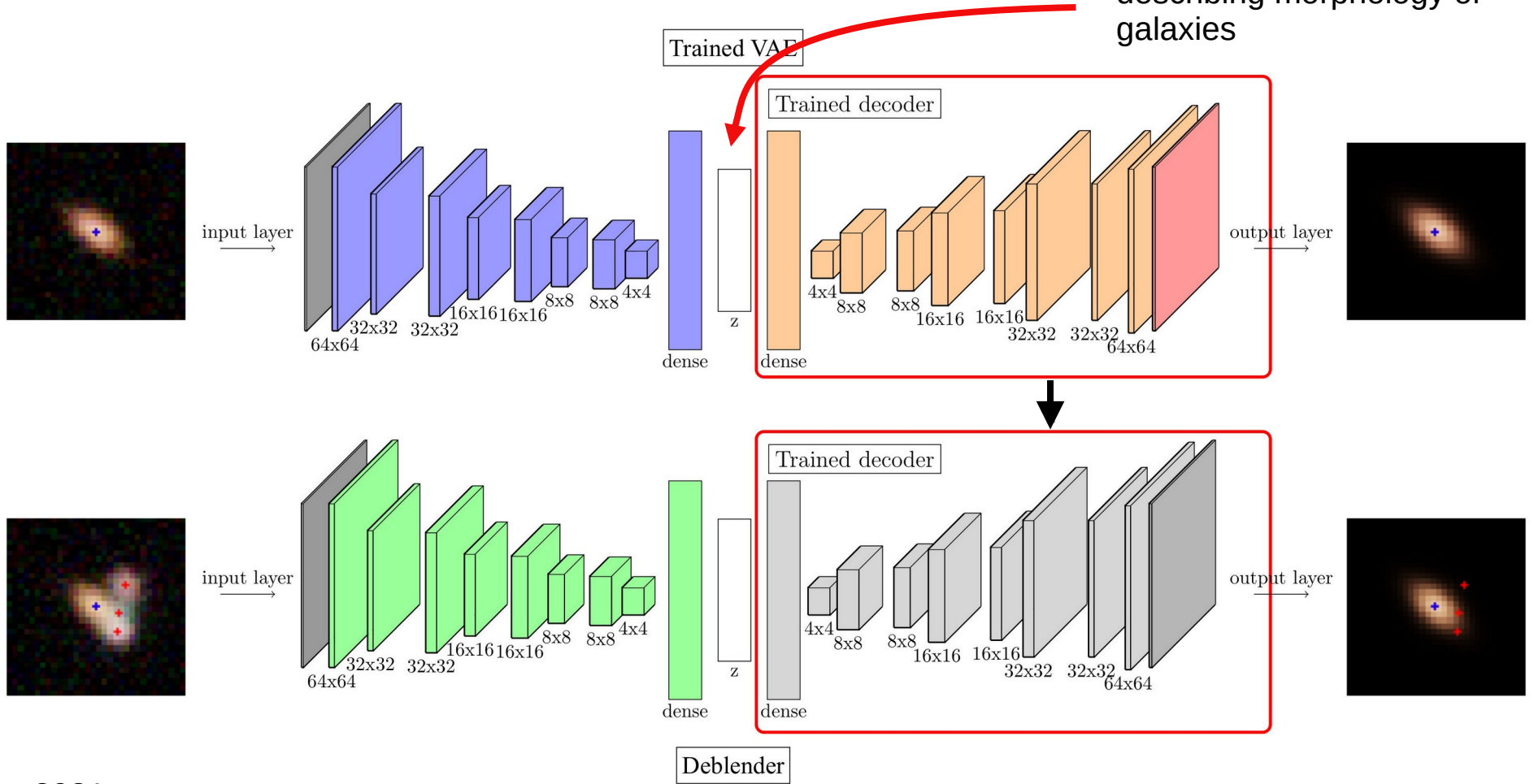
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Gaussian distributions describing morphology of galaxies



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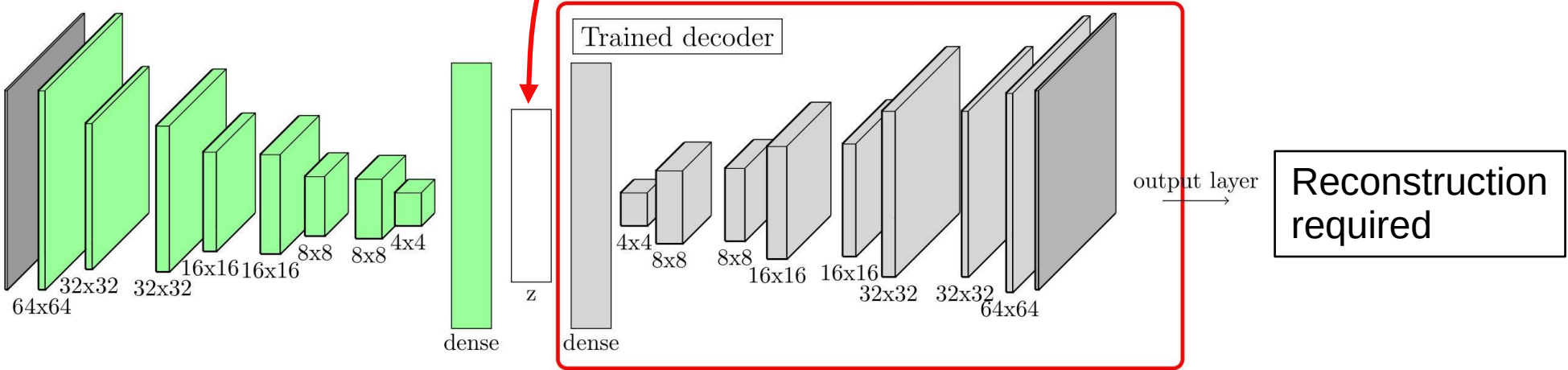
Gaussian distributions describing morphology of galaxies





# OOD detection method

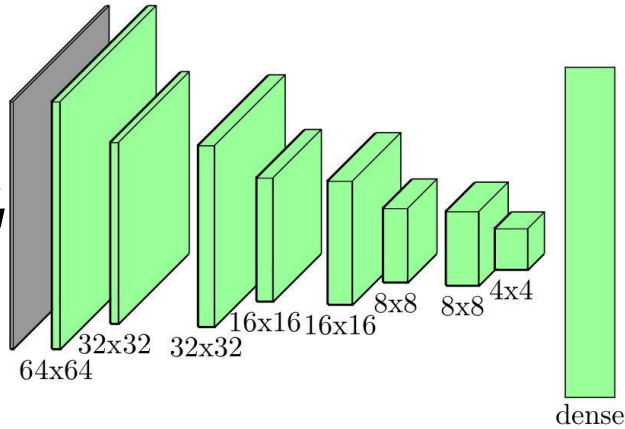
Latent space contains full description of input blend



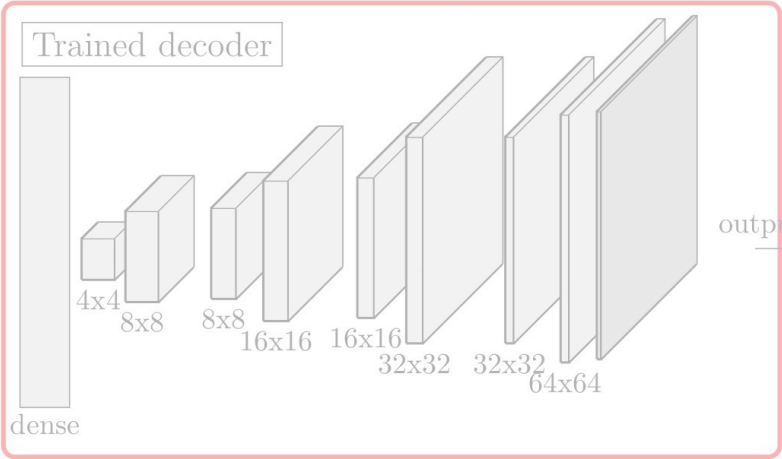
# OOD detection method

IID train set

IID + OOD  
test set



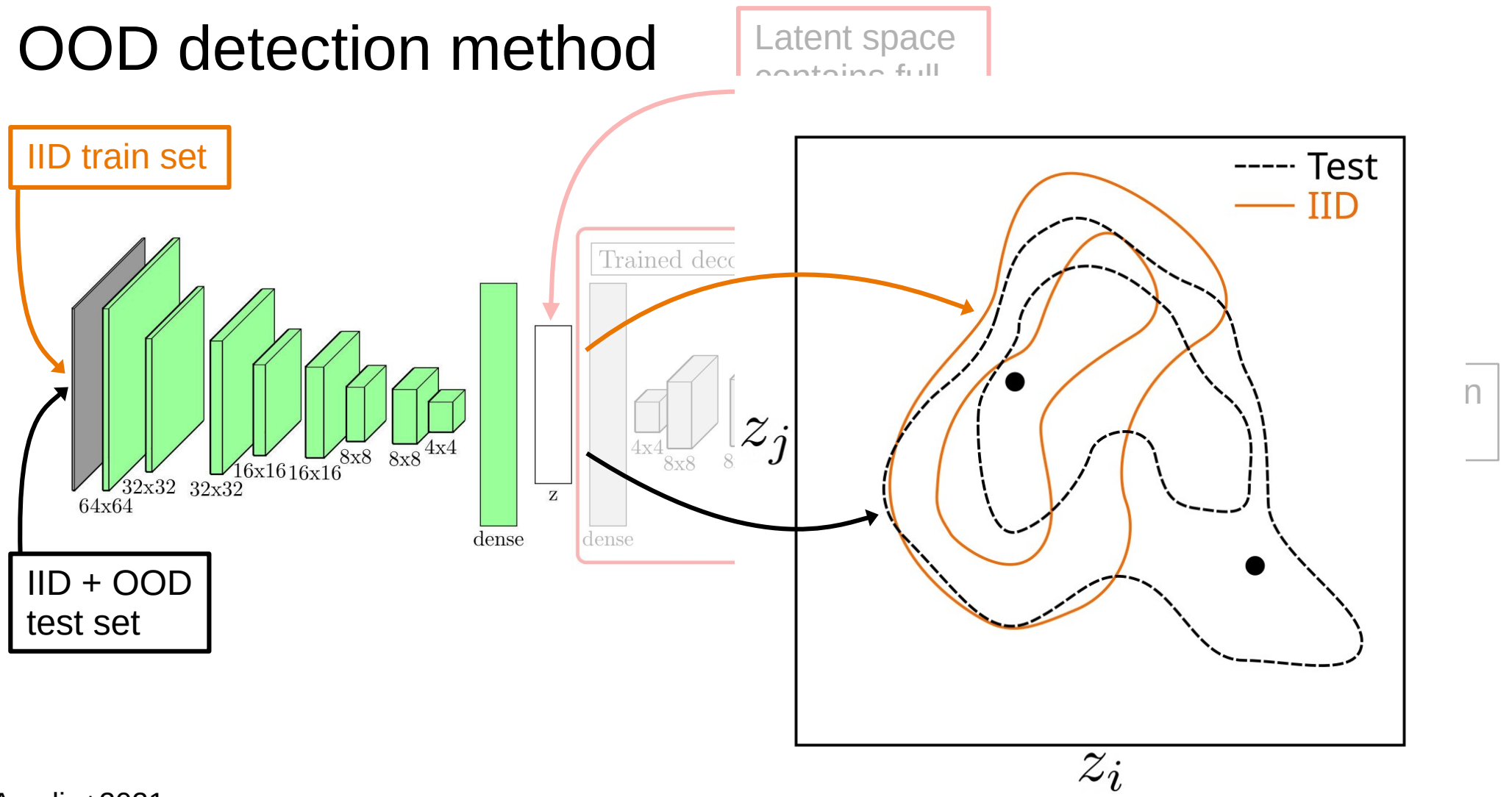
Latent space contains full description of input blend



Reconstruction required

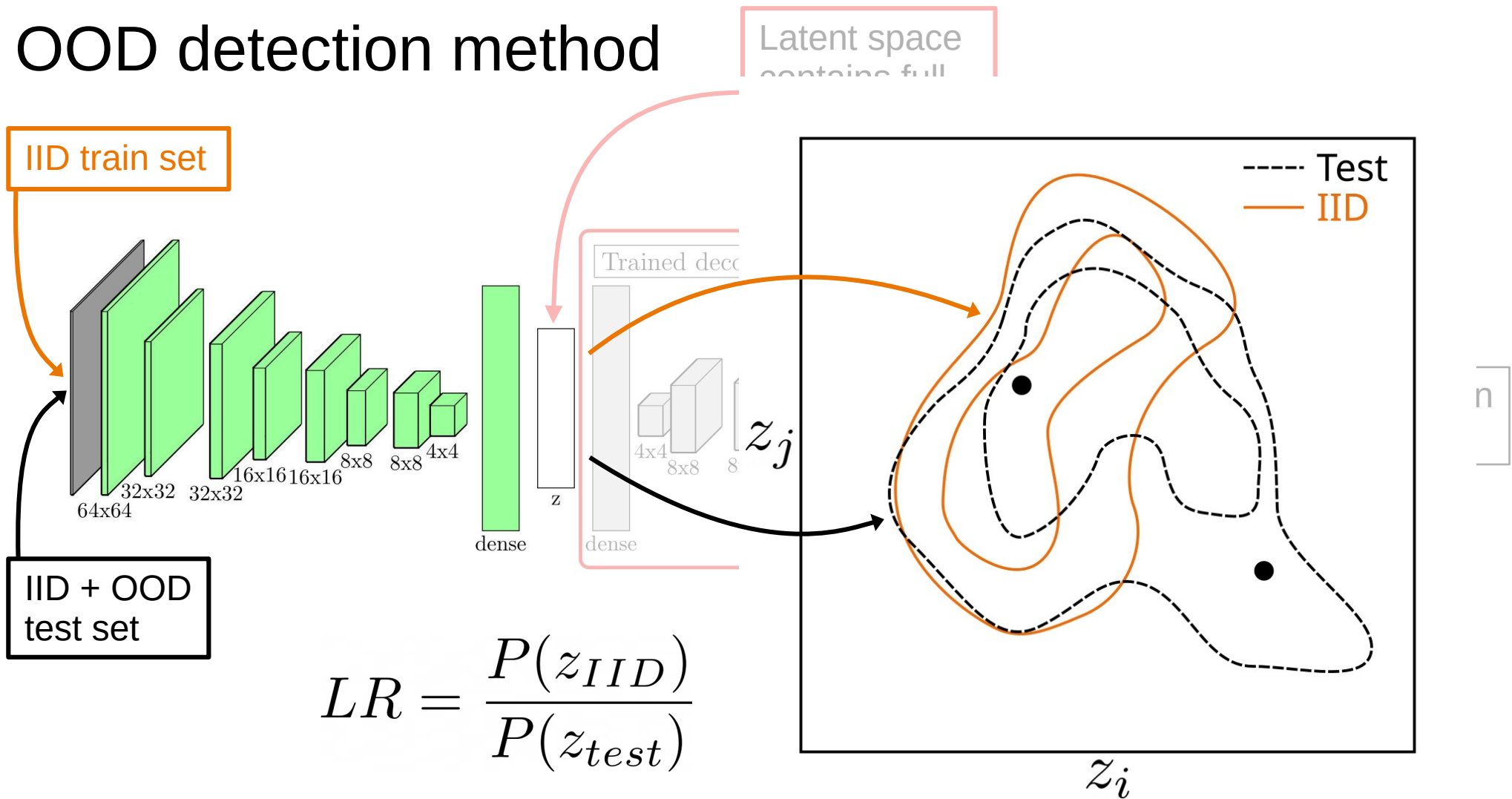


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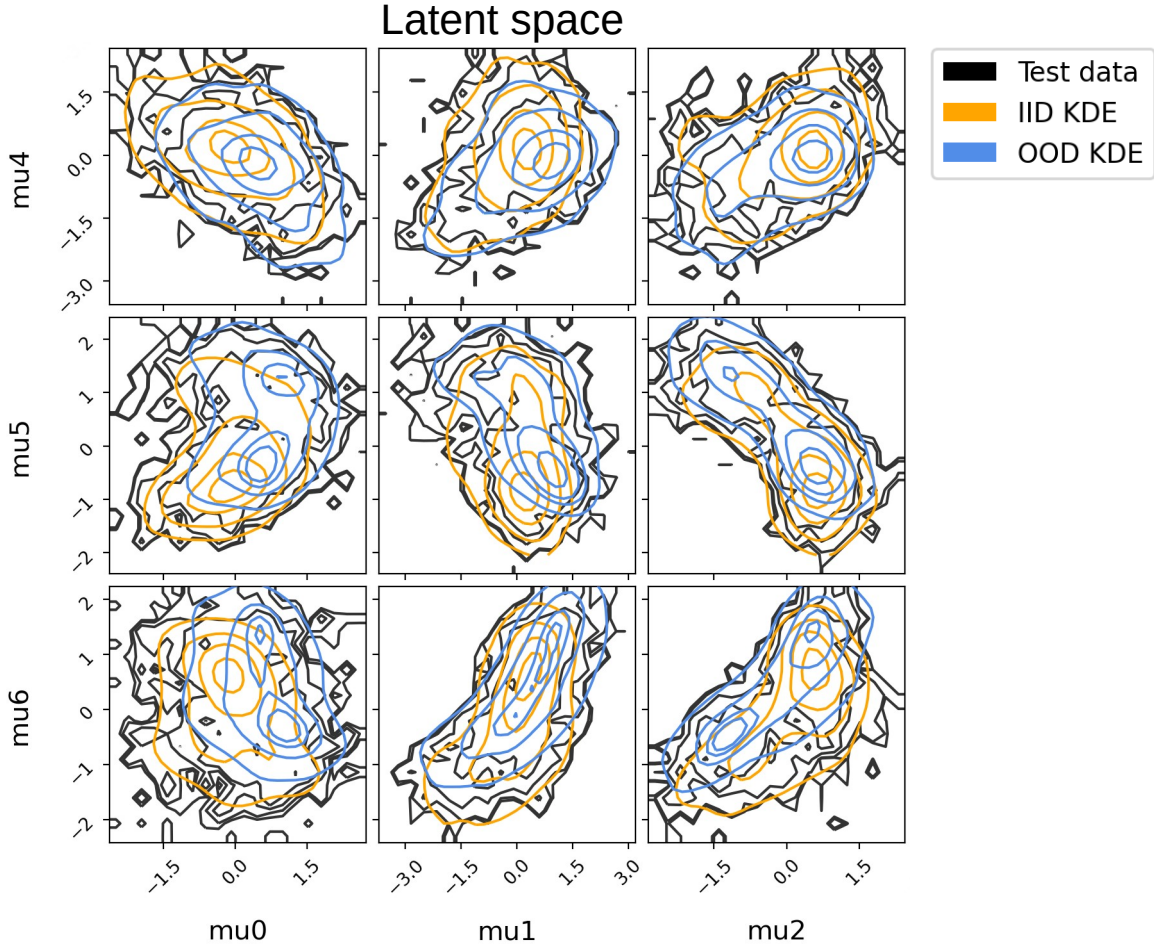
Arcelin+2021

# OOD detection method

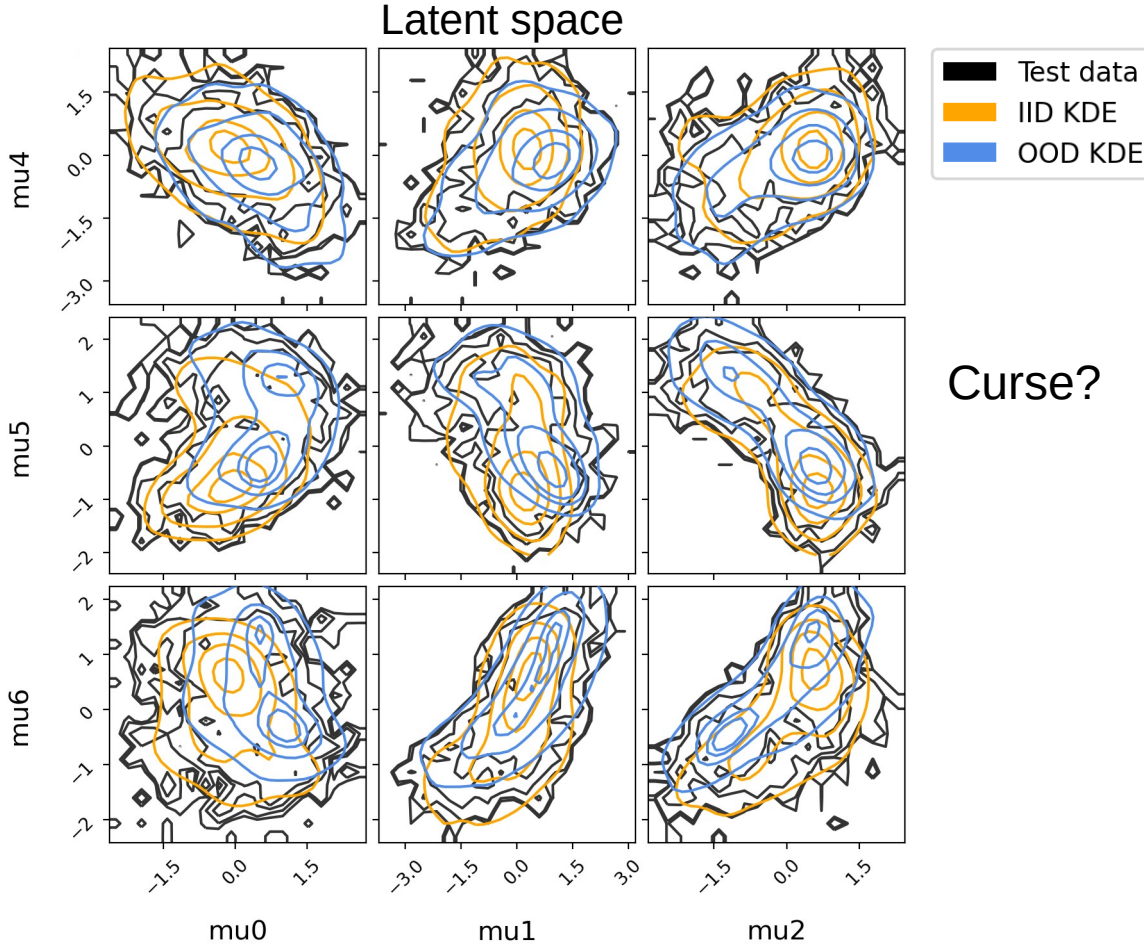




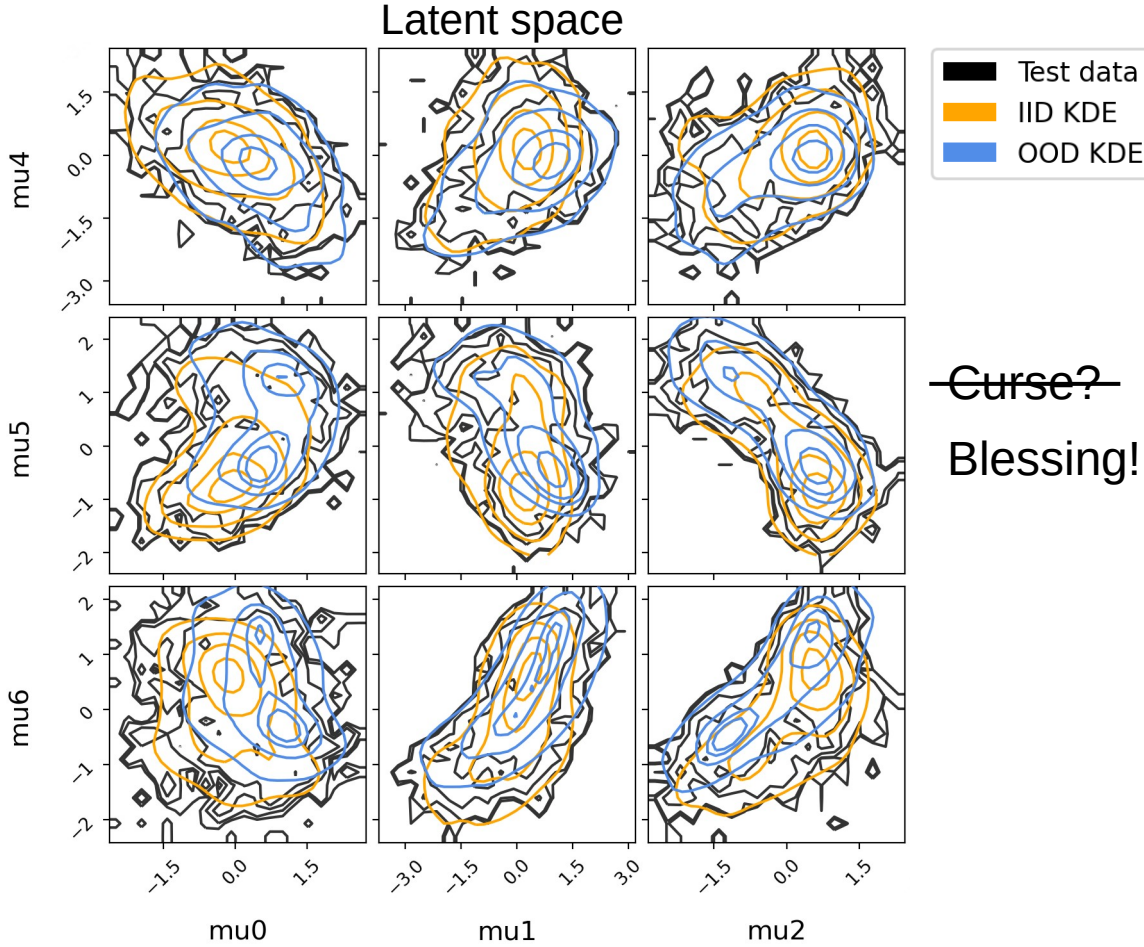
# OOD detection performance



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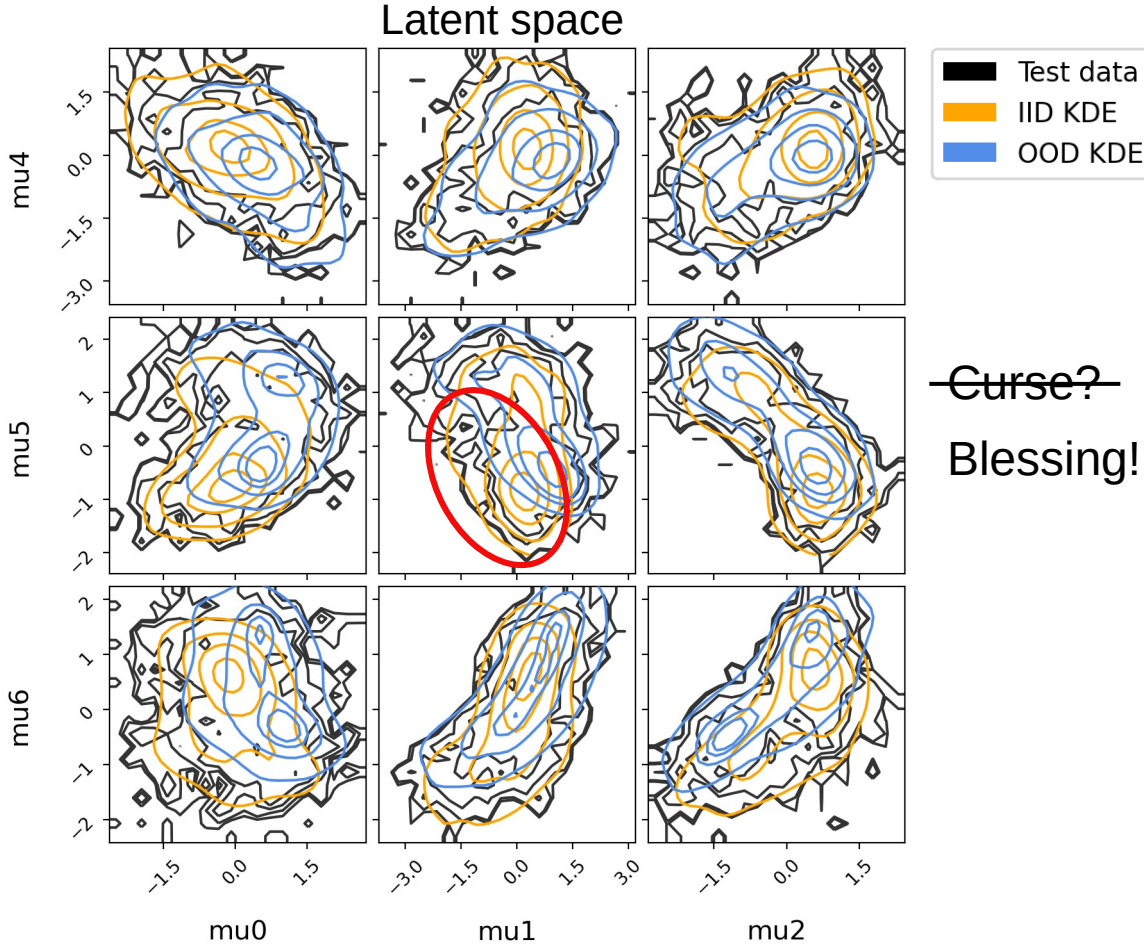


# OOD detection performance

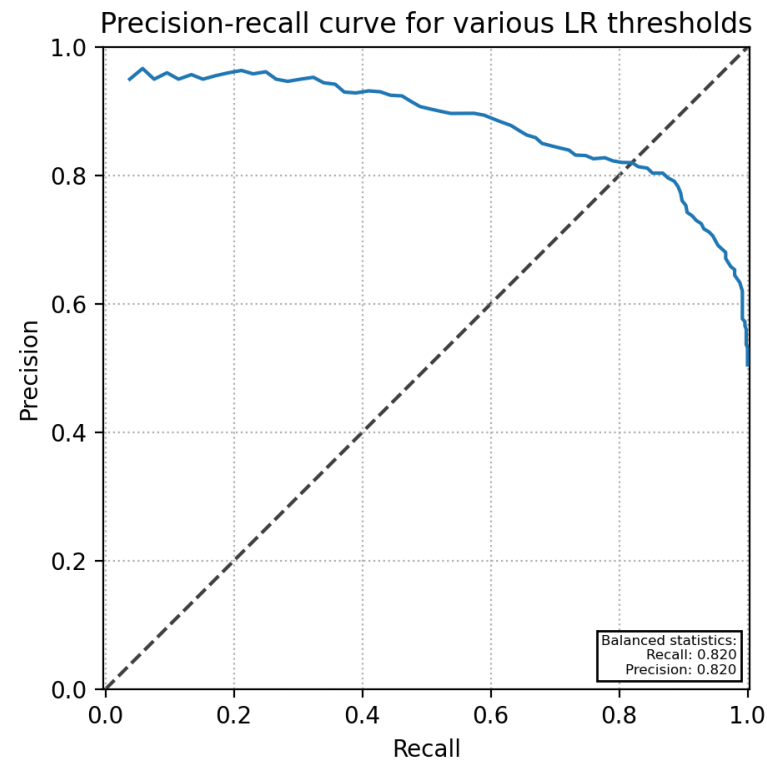
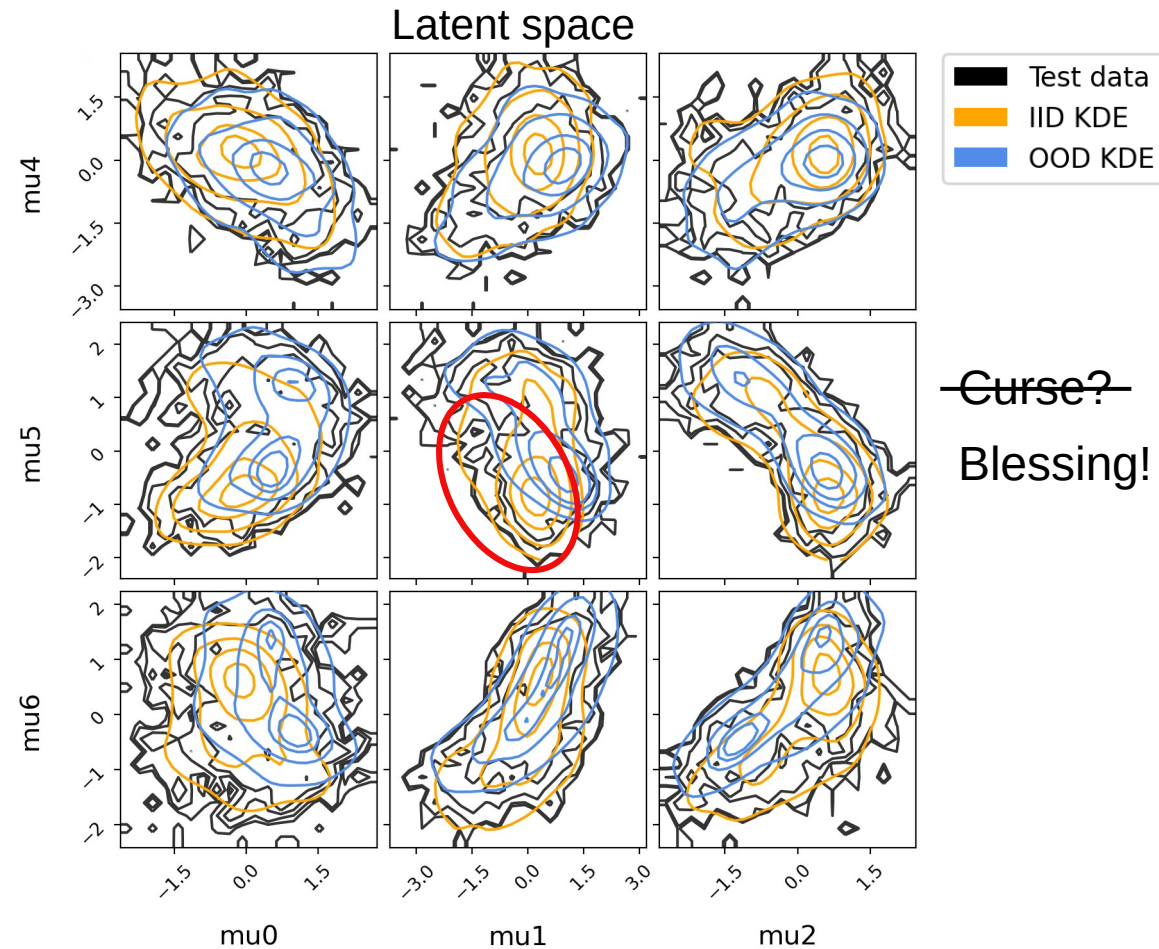




# OOD detection performance

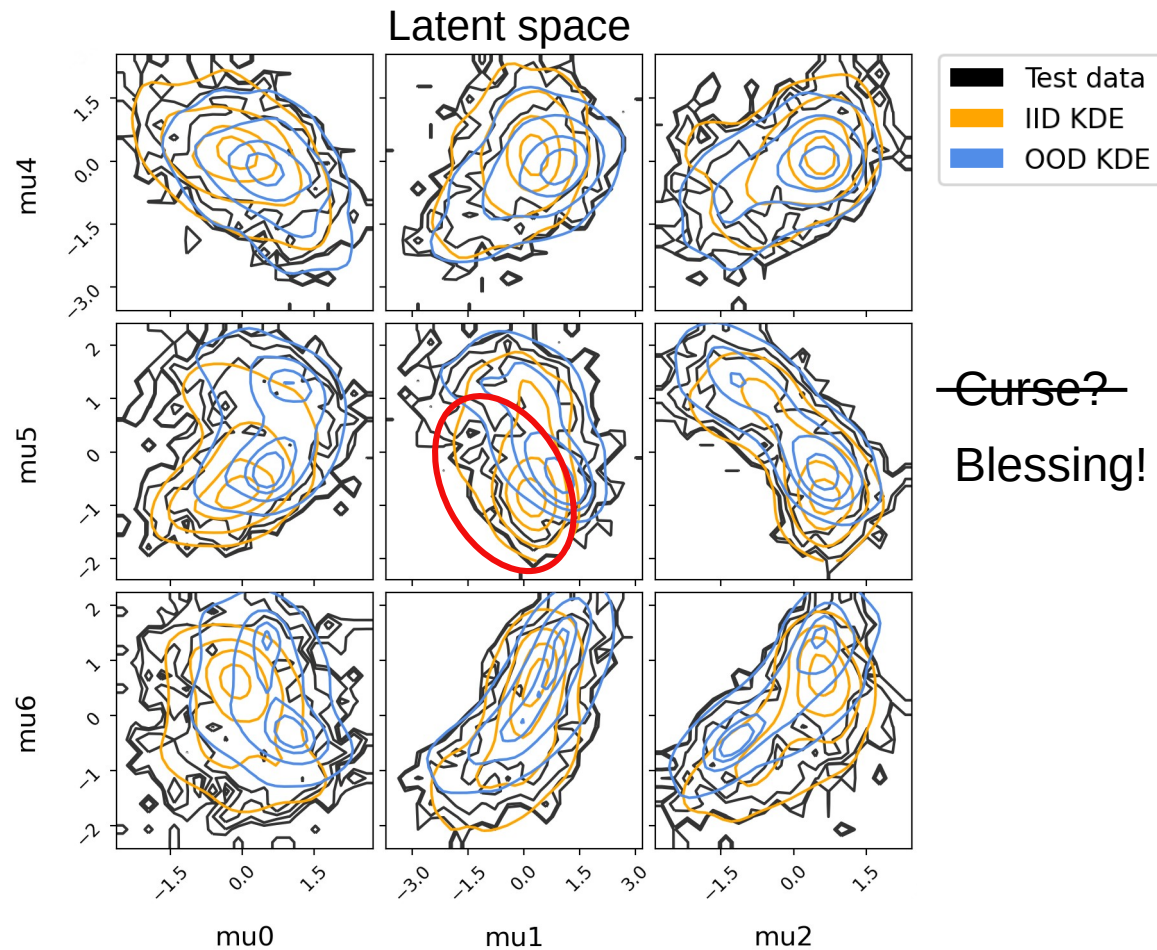


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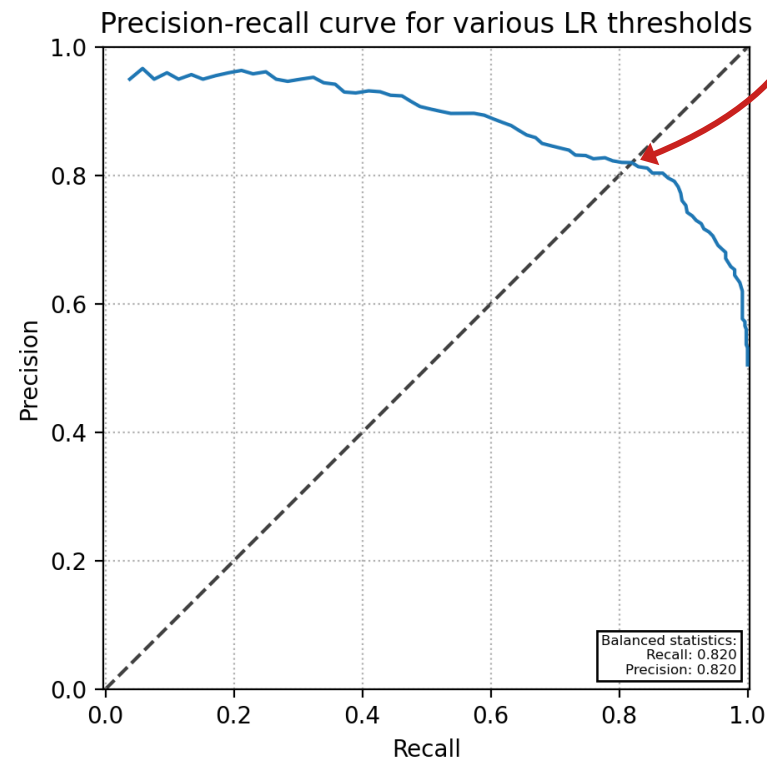


Mes et al. (in prep.)

# OOD detection performance



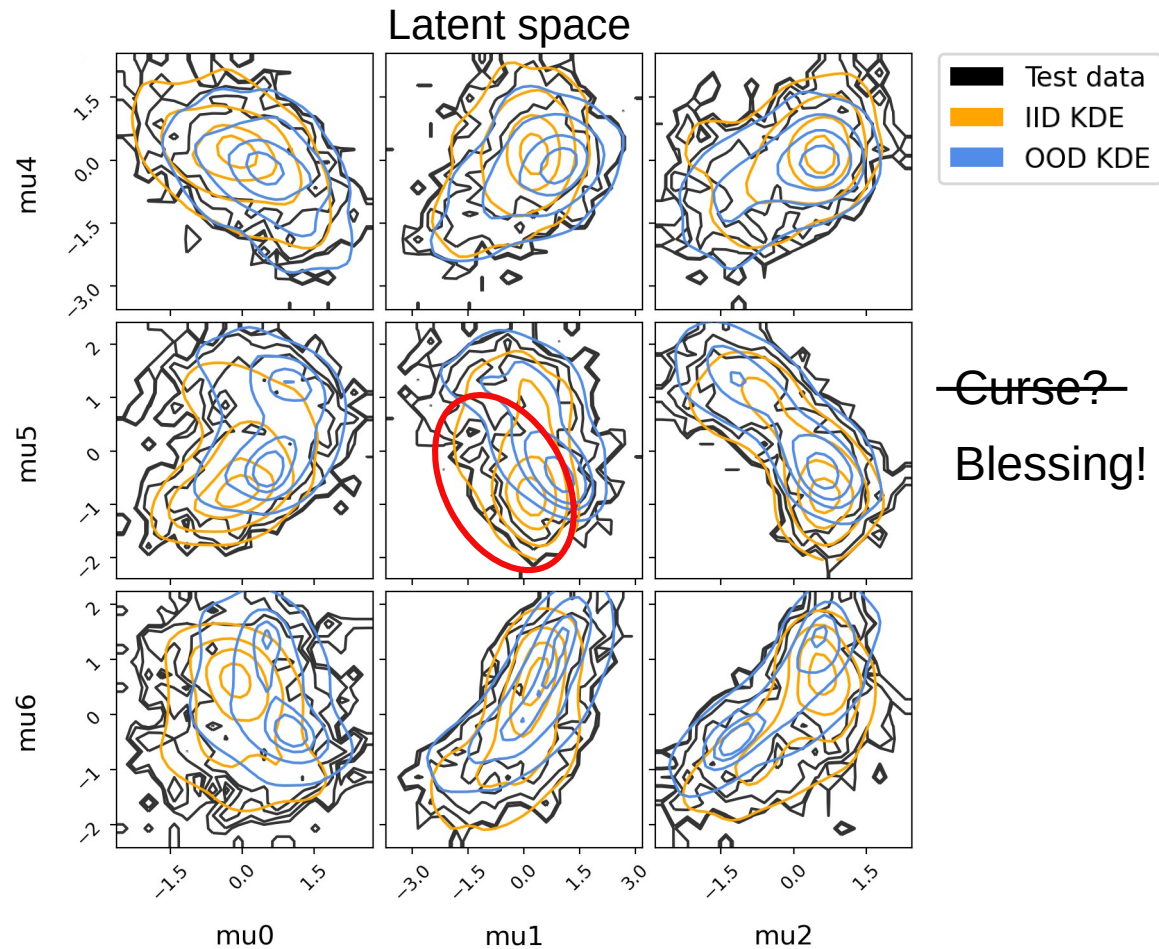
82% recall & precision



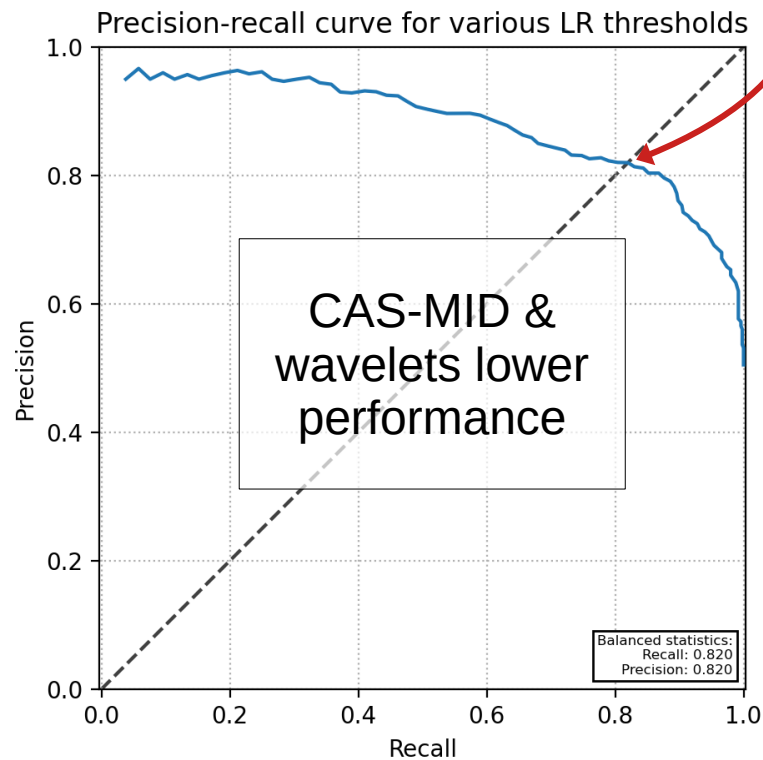
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Mes et al. (in prep.)

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Find me in person, on Slack or mail: [mes@strw.leidenuniv.nl](mailto:mes@strw.leidenuniv.nl)