

# Feature extraction for 2D / 3D shape representation with application in nanophotonic component design

Industrial Problem Solving Workshop

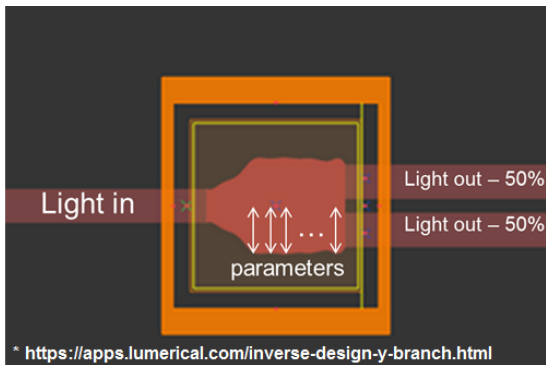
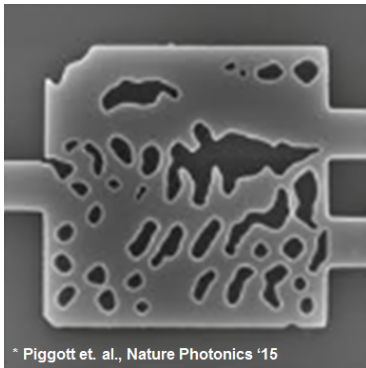
Université de Montréal

2019

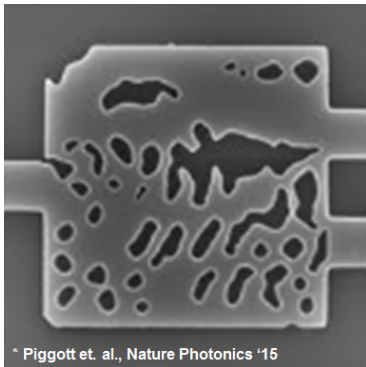
# Merci, Thanks!



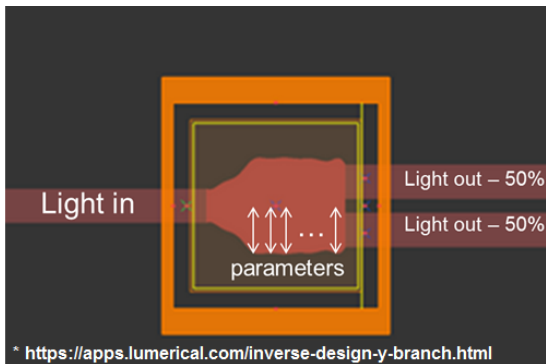
# Motivation



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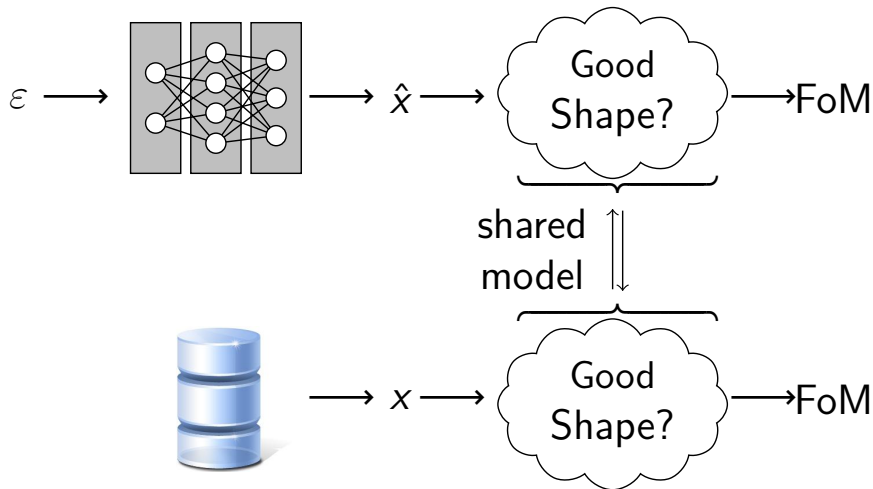


- Data-driven approach
- Nonparametric model

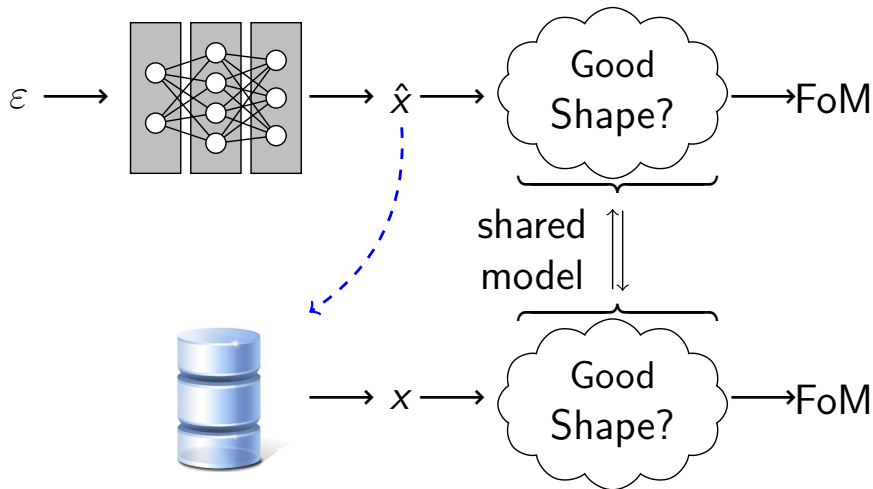


- Human intuition of the physics
- Low dimensional parametric model

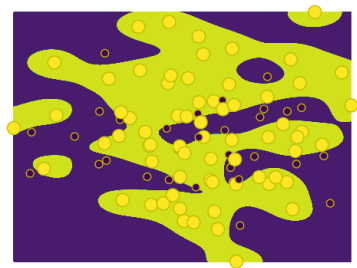
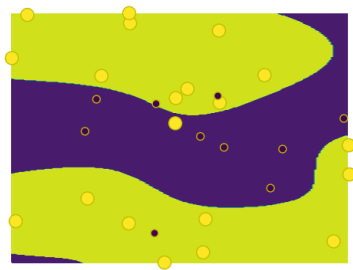
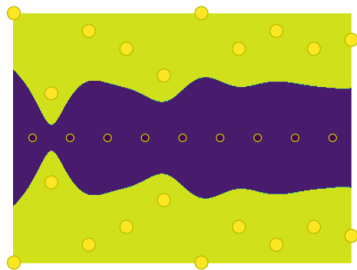
# Long Term Approach



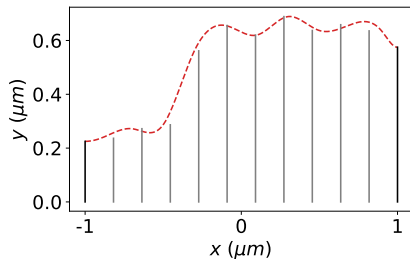
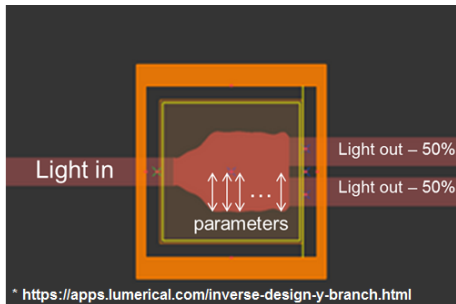
# Long Term Approach



# Shape Generation

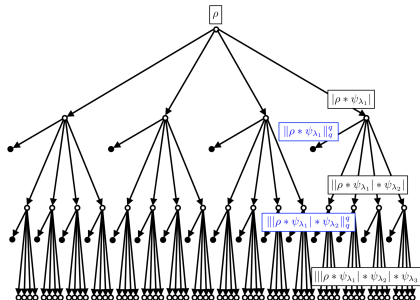
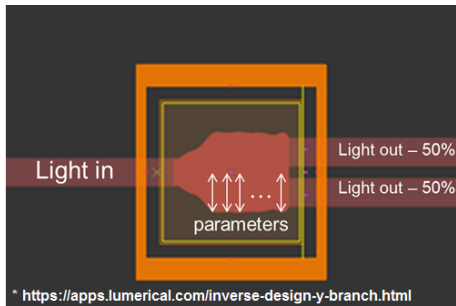


# Surrogate Model

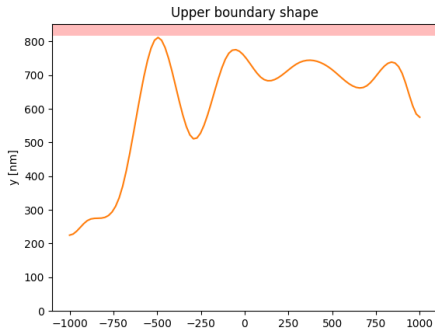
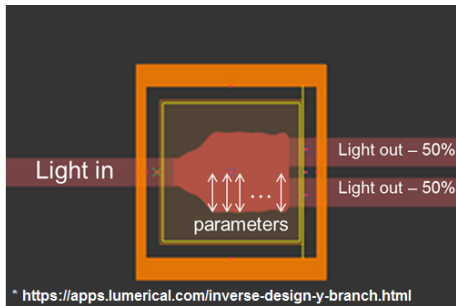




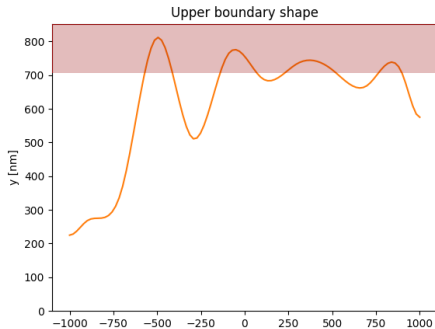
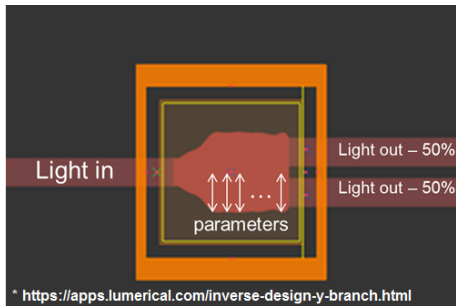
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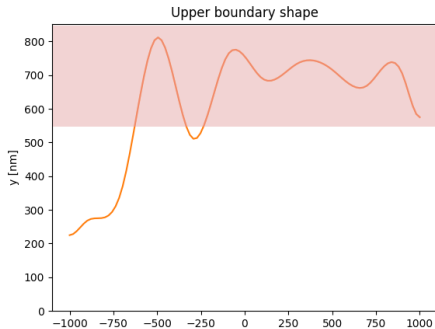
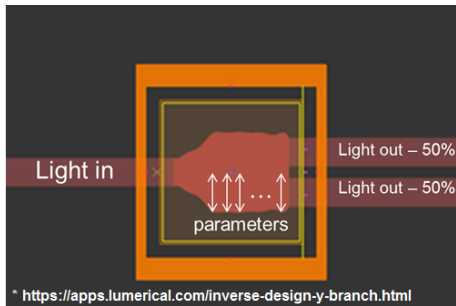
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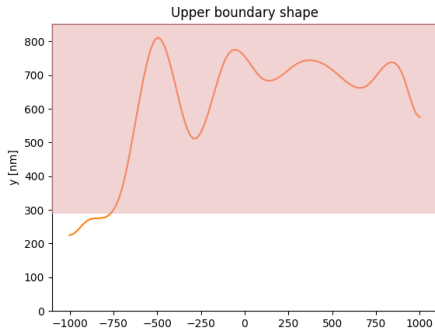
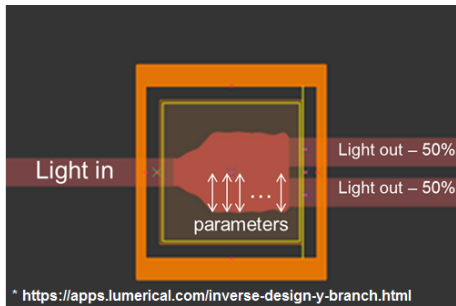
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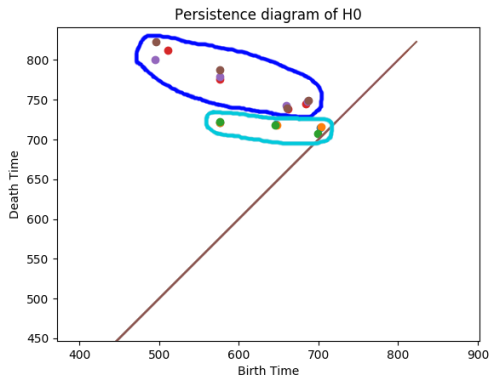
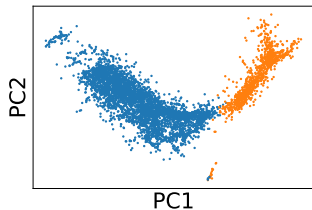
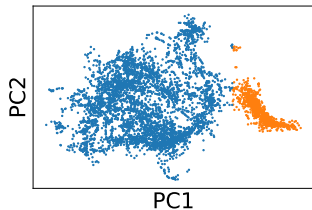
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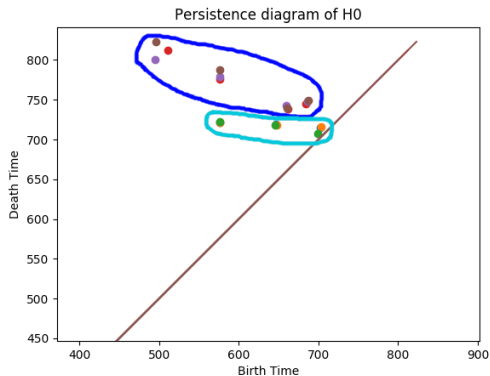
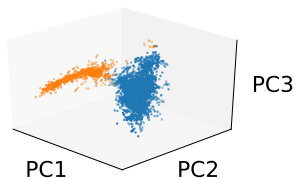
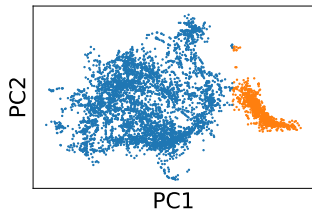
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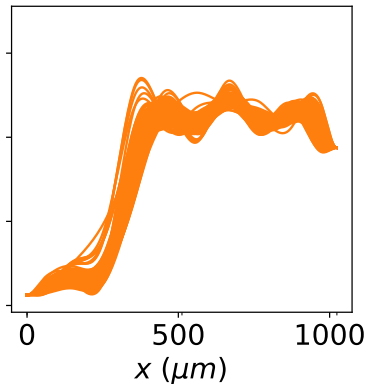
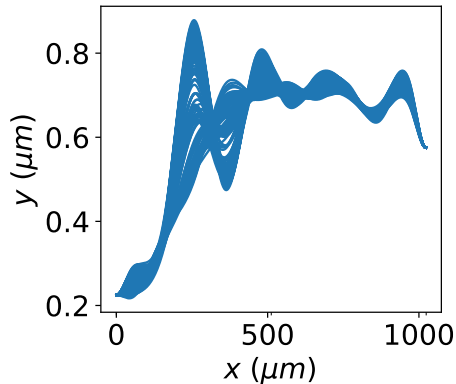
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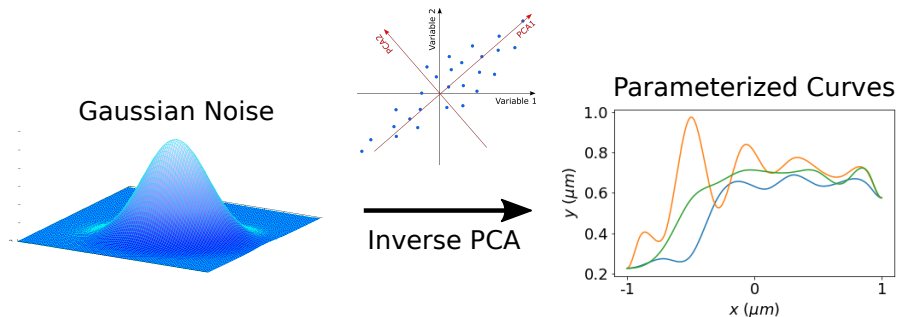
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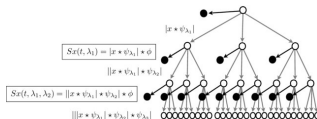
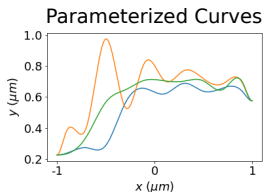
# Proof-of-Concept for Design Generation

Regression based; automated, but still parametric...



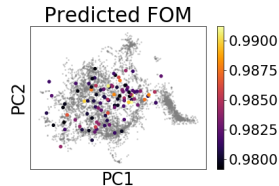
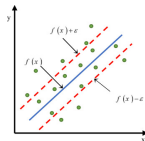
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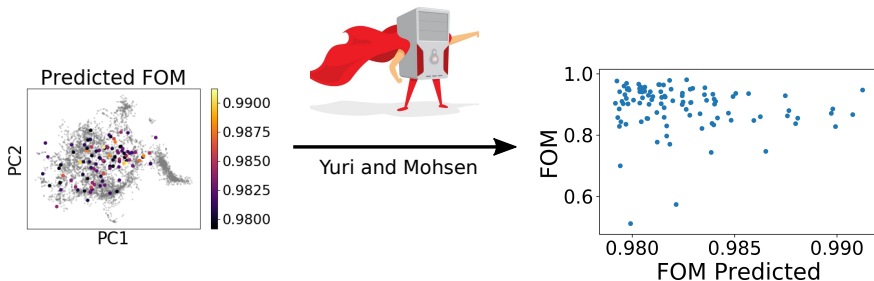
1D Scattering Transform

+ Support Vector Regression



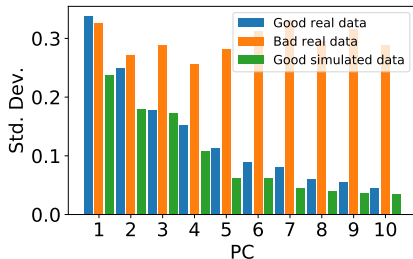
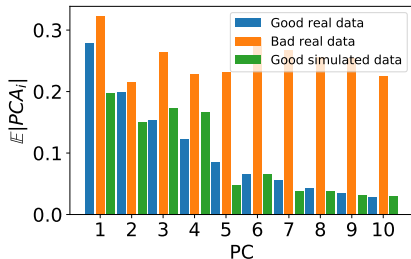
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These questions are all individually difficult, but will inspire innovative new research directions at the interface of data driven modeling for inverse problems, machine learning, physics, and shape design.