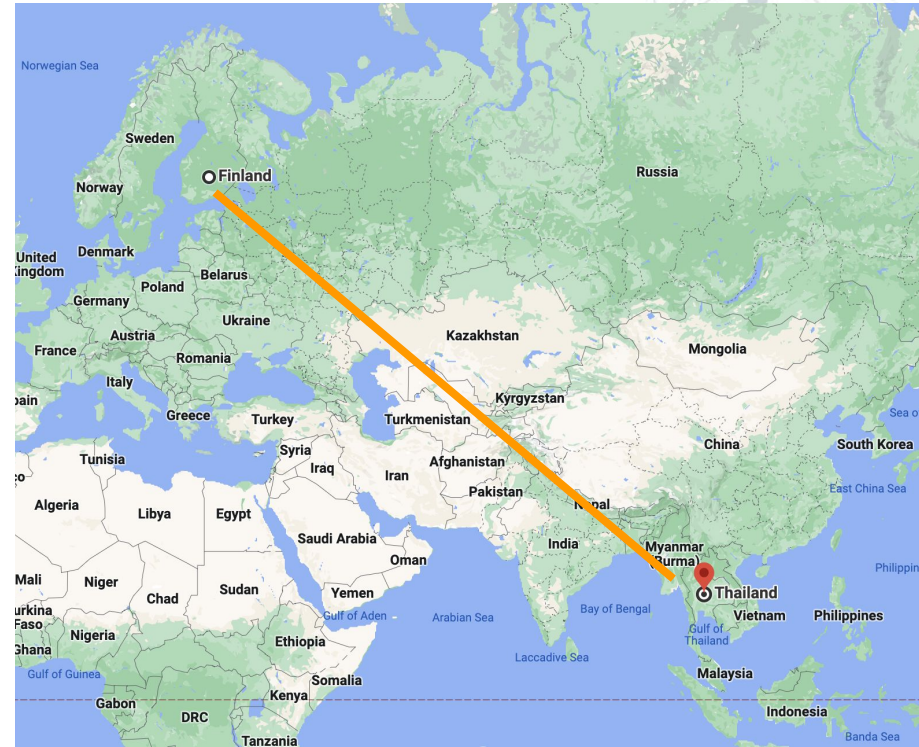


About myself

- My name is Patin Inkaew
- My hometown is Bangkok, Thailand



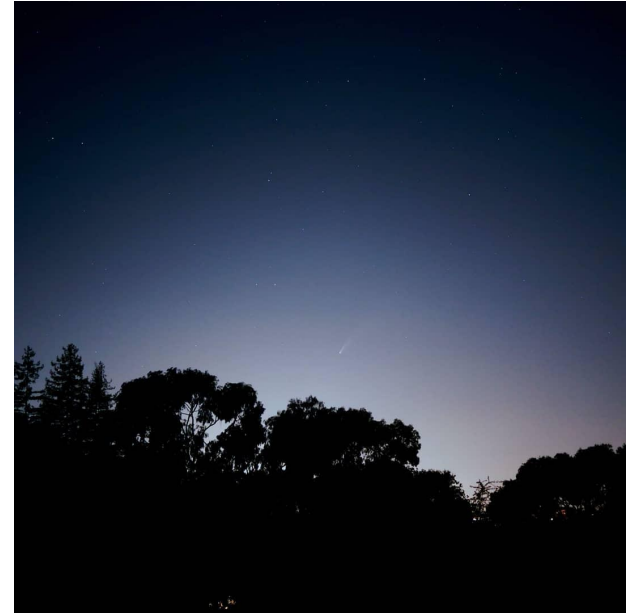
About myself

- I graduated from Stanford University, California
 - B.S. in Physics, with minor in Mathematics and East Asian Studies (Japanese)
 - M.S. in Computer science with specialization in AI / ML



Talk to me about

- Amateur Astronomy / Photography
- DIY / maker project
- Japanese food/ snack / pop culture
- Sport: swimming, badminton





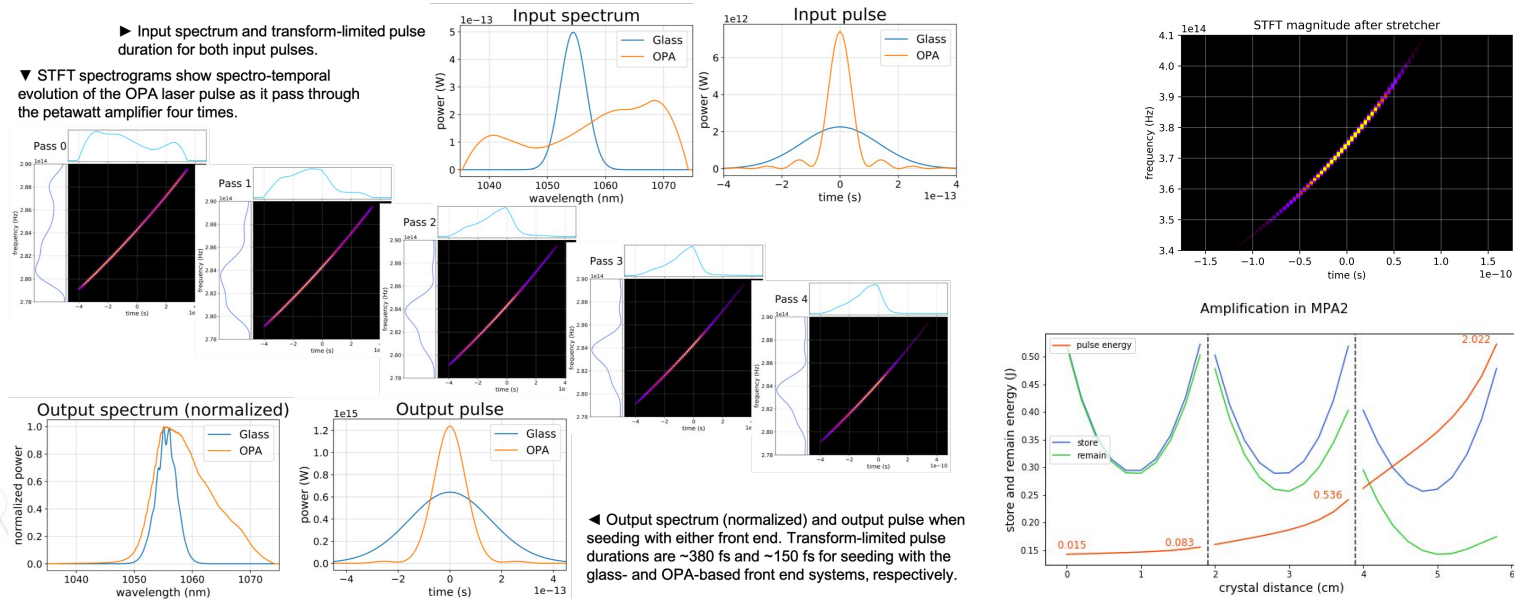
PHYSICS PROJECTS EXPERIENCE

SCALLOPS: Simulation of Crystal Amplification of Laser Light and Optical Pulse Shaping

- Novel Petawatt laser, improved laser safety
- Simulation framework in Python
- Frantz-Nodvik equation, Short-Time Fourier Transform (STFT)

► Input spectrum and transform-limited pulse duration for both input pulses.

▼ STFT spectrograms show spectro-temporal evolution of the OPA laser pulse as it passes through the petawatt amplifier four times.

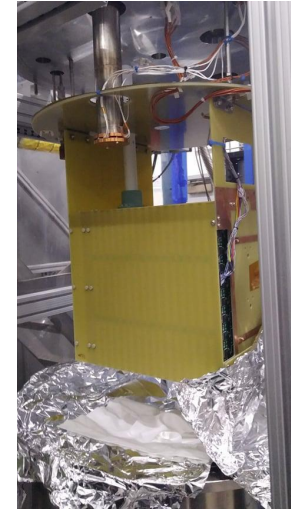
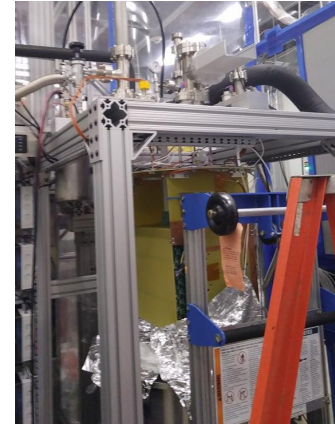
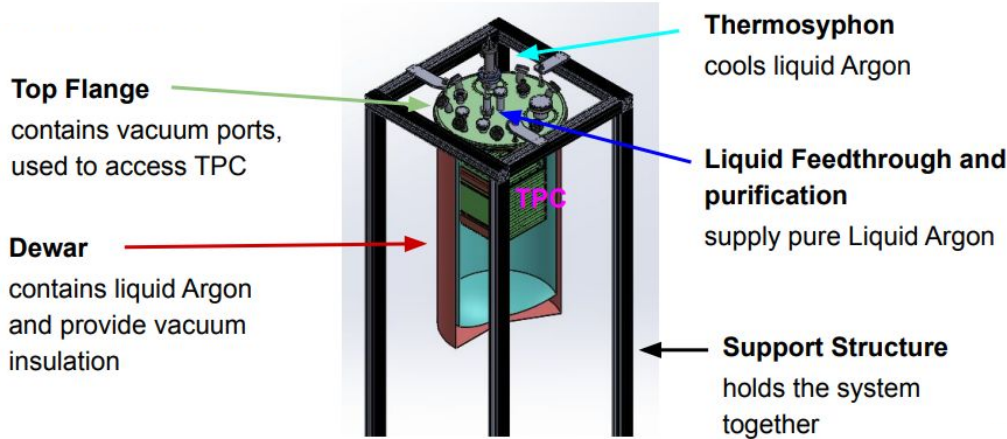


◀ Output spectrum (normalized) and output pulse when seeding with either front end. Transform-limited pulse durations are ~380 fs and ~150 fs for seeding with the glass- and OPA-based front end systems, respectively.

PHYSICS PROJECTS EXPERIENCE

Design of Cryogenic System for Prototype LArTPC (Liquid Argon Time Projection Chamber)

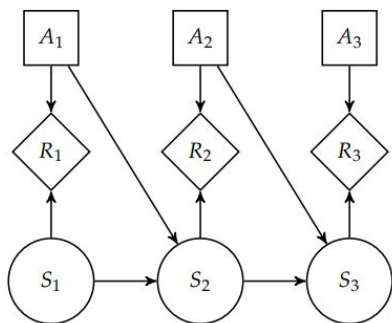
- New testing prototype for DUNE experiment
- CAD design, Vacuum, Pumping, and Cooling system
- ML-based particle tracking system and calorimetry



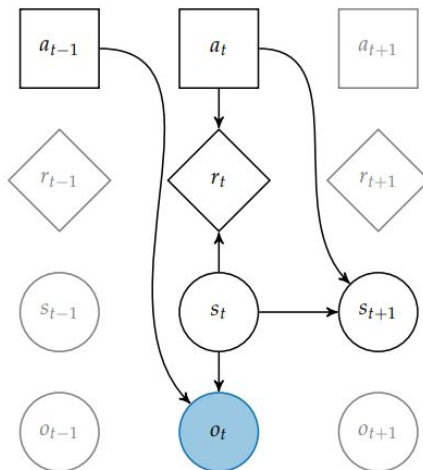
MACHINE LEARNING PROJECTS EXPERIENCE

Exploring a full joint observability game with Markov decision processes

- optimal policy for Liar's Dice modelled as Multi-agent MDP and POMDP (Partially Observable MDP)
- work on POMDP, comparing different policies based on probability/risk estimation



MDP



POMDP

SIMULATION OF 1000 GAMES

Player 1	Player 2	Player 1 wins	Player 2 wins
(L, DN)	(T, DN)	0.495	0.505
(L, DN)	(N, DC)	0.482	0.518
(T, DN)	(N, DC)	0.479	0.521

10 GAMES AGAINST HUMAN PLAYERS

Player 1	Player 2	Player 1 wins	Player 2 wins
Human	(L, DN)	0.5	0.5
Human	(T, DN)	0.3	0.7
Human	(N, DC)	0.3	0.7



MACHINE LEARNING PROJECTS EXPERIENCE

Text-guided Image Generation with Diffusion Models and CLIP

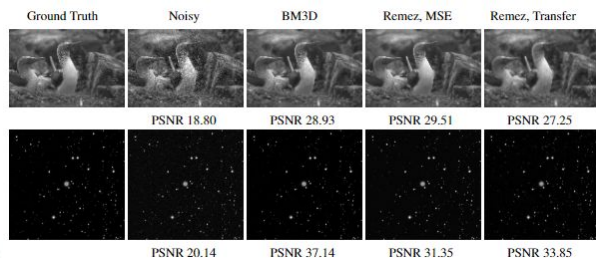
- diffusion / score-based deep generative models for contrastive-assist conditional image synthesis

Exploring image captioning with the Perceiver

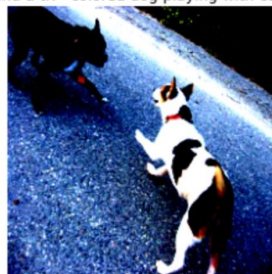
- end-to-end transformer-based encoder-decoder architecture

Training CNN to Denoise Images Corrupted by Mixed Poisson-Gaussian Noise Without Ground Truth Data

- training with unbiased risk estimator, transfer learning in astrophysical images



Split:train
 GT:two dogs on pavement moving toward each other .
 Predict:a black dog and a tri - colored dog playing with each other on the road .



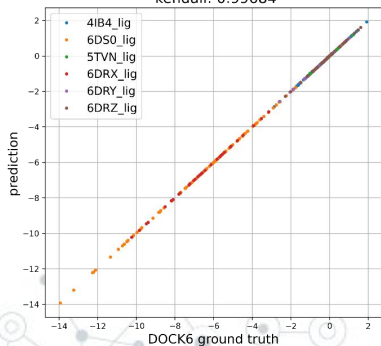
MACHINE LEARNING PROJECTS EXPERIENCE

Physics-based scoring function for drug discovery

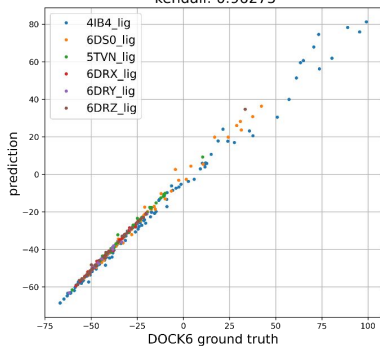
- numpy and pytorch physics-based scoring function to accelerate ML applications in drug discovery
- 3D protein structure as a 3D point cloud and graph
- learn geometric deep learning and equivariant network
- learn representation learning

target: 5HT2B, pdb code: 4IB4, ligand pdb code: all
num ligands: 6, total poses: 442

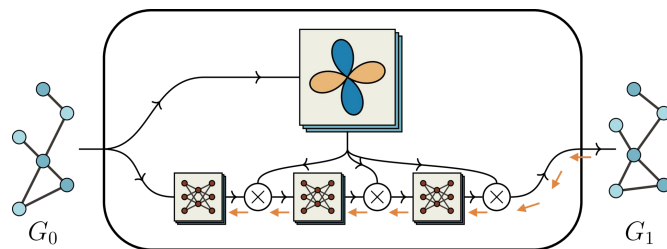
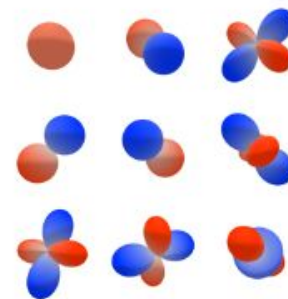
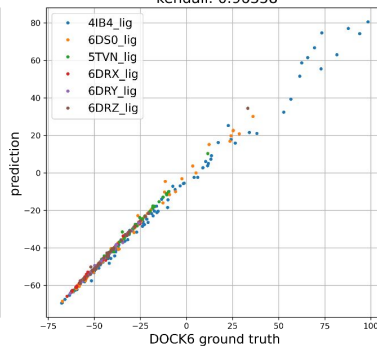
es energy comparison: 5HT2B all
pearson: 1.00000
spearman: 0.99996
kendall: 0.99684



vdw 6-9 energy comparison: 5HT2B all
pearson: 0.99590
spearman: 0.99716
kendall: 0.96275



total 6-9 energy comparison: 5HT2B all
pearson: 0.99608
spearman: 0.99717
kendall: 0.96358



Pictures



Stockholm,
Sweden



Narvik, Norway

Pictures



Oslo, Norway



Reine, Norway

Pictures



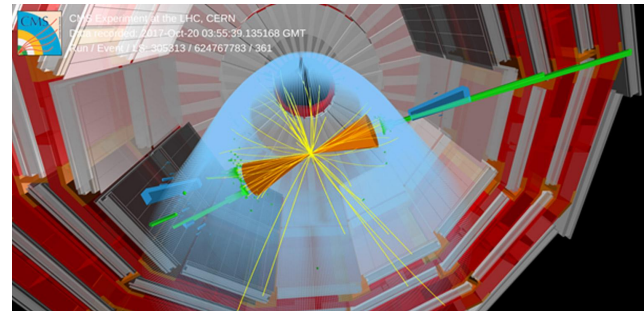
From Oodi



Suomenlinna

SMARTHEP Program

- CERN + Computer Science & Industry
- Real-Time Analysis (RTA)
- **Machine learning and Real-Time Analysis for Higgs boson measurements and fleet safety**
 - University of Helsinki (here)
 - Secondments: CERN (Switzerland), Verizon Connect (Italy)

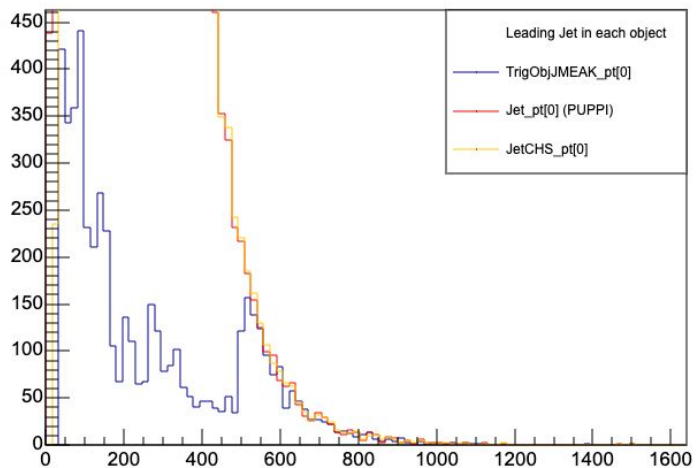


Startup Project

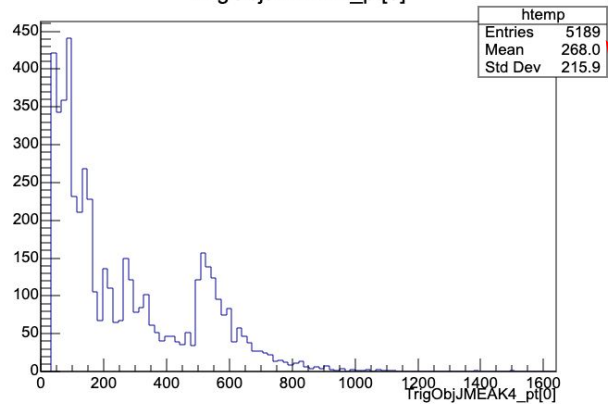
- [US-ATLAS Mini Course on Jet](#)
- basic ROOT (Plotting, Fitting, File IO)
 - [ROOT Primer](#): good starting point
 - [ROOT training](#): basic and summer student courses
- Columnar Analysis with Coffea
 - Uproot, Awkward Array, Coffea
 - [HATS@LPC](#) has many tutorials, recordings
 - Coffea deprecated [histogram](#) for dedicated package ([migration guide](#))
 - Coffea will move to use [Vector](#) in Version 0.8 (Vector works with awkward)
- Compare offline and online Jets
 - Offline Jets have more sophisticated reconstruction methods
 - Online Jets have more statistics

Some plots

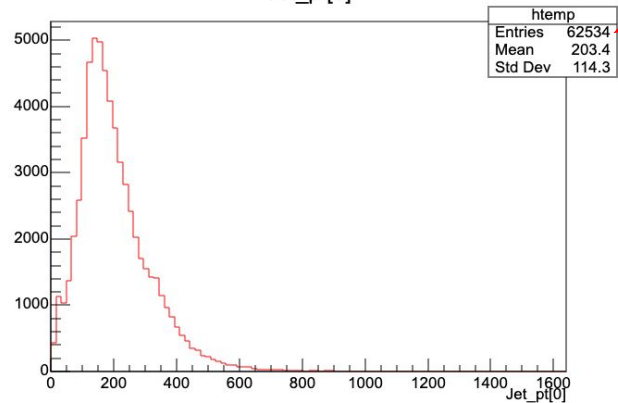
Comparison of Jet pt



TrigObjJMEAK4_pt[0]

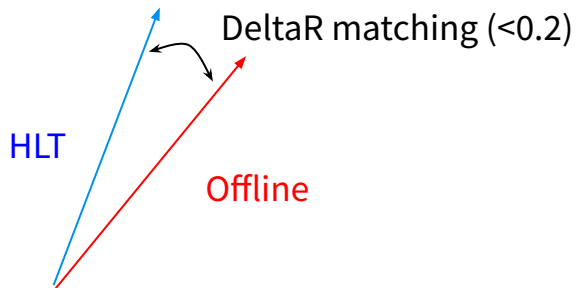


Jet_pt[0]



Comparison between offline and HLT Jet

- Dataset: JMENanoRun3_v2p1_Run2022D-PromptReco-v2/JetMET



- $p_T(\text{offline})/p_T(\text{HLT})$ in eta/pt-bins
 - Right: Offline = CHS

