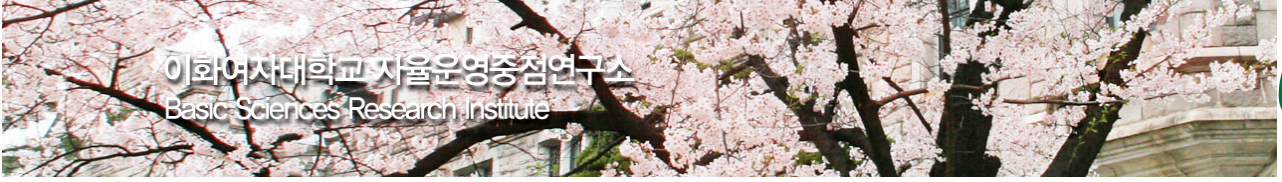

자율운영중점연구소 융합포럼

2025/8/28 (목) 2pm–5pm (이화-포스코관 B153)

기초과학연구소 자율운영중점연구소 주최로 **인공지능**과 **양자컴퓨팅** 분야의 최신 연구를 공유하고, **학제 간 공동연구를 모색**하는 융합포럼을 개최합니다. 이번 포럼은 **양자컴퓨팅과 생성 모델, 다중 에이전트 강화 학습 등 최첨단 인공지능 기술**을 소개하고, 새로운 연구 시너지를 창출하는 뜻깊은 자리가 될 것입니다. 교수님, 대학원생, 및 학부 연구생들의 많은 관심과 참여를 부탁드립니다.

14:00	환영사 : 김동하 교수 (기초과학연구소장)
14:10	최태영 교수 (이화여대) **Trapped Ion-based Quantum Computer**
14:45	윤홍기 교수 (강원대) **Generative Models and Machine Learning for Magnetic Materials**
15:20	중간 휴식 (20분)
15:40	나형호 박사 (KAIST / UNIST) **Sample-efficient Multi-agent Reinforcement Learning and Applications**
16:15	최재웅 교수 (성균관대) **Generative Modeling via Neural Optimal Transport**
16:50	총평 및 폐회사

최태영 교수

이화여대 물리학과

- 양자컴퓨팅
- 이온 트랩

윤홍기 교수

강원대 반도체물리학과

- 고체물리 이론
- 기계학습 / 생성형 AI

나형호 박사

KAIST → UNIST 산업공학과

- 기계학습 / 항공우주
- 다중 에이전트 강화 학습

최재웅 교수

성균관대 통계학과

- 통계적 머신러닝
- 생성모델

[주최 및 문의] 이화여자대학교 자율운영중점연구소 / 기초과학연구소 (유지은 행정원: 02-3277-5034, ji-yu_pri@ewha.ac.kr)

EWHA-POSCO Bldg. B153
@ Aug. 28 (Thu.) 2pm–5pm

Organized by Prof. Dong Ha Kim (Chemistry)
Prof. Dongseok Suh (Physics)
Prof. Weonyoung Joo (Statistics)

Abstracts

Prof. Taeyoung Choi (Ewha Womans University)

Trapped ion-based Quantum Computer

In recent years, understanding, controlling, and utilizing quantum systems have been one of major research interests across fields of physics, chemistry, and material science. Among various physical platforms, the trapped ion system has been one of successful architectures for coherent quantum control and has demonstrated key ingredients such as high-fidelity single qubit and two qubit entangling gate for quantum computation and simulation. In this talk, I plan to introduce basic physics of trapped ion system and how to develop this platform toward a practical quantum information processor. More specifically, I would like to focus on how to scale up the trapped ion system both in the aspect of hardware (increase of the number of qubits) and software (achieving high fidelity quantum gates via phase modulation).

Prof. Hongkee Yoon (Kangwon National University)

Generative Models and Machine Learning for Magnetic Materials

This talk will present computational building blocks for magnetic material discovery, combining generative models and machine learning approaches. We develop diffusion-based generative models for material discovery, spin-aware machine learning force fields, and magnetic force theory for exchange interaction calculations, providing foundational methodologies for future material design.

Dr. Hyungho Na (KAIST)

Sample-efficient Multi-agent Reinforcement Learning and Applications

Multi-agent reinforcement learning for cooperative tasks has gained attention as a method to build autonomous agents and has been applied to various systems. However, existing algorithms still require significant learning time and often get trapped in local optima when faced with complex tasks. This seminar introduces the methods to increase sample efficiency through representation learning and memory-based incentives and presents related applications.

Prof. Jaewoong Choi (Sungkyunkwan University)

Generative Modeling via Neural Optimal Transport

Optimal Transport (OT) provides a principled framework for transforming one probability distribution into another through a cost-minimizing map. Leveraging this map from a simple prior to a complex data distribution has emerged as a powerful approach in generative modeling. However, standard OT is sensitive to outliers and often encounters optimization challenges. In this talk, I will introduce a generative modeling framework based on Unbalanced Optimal Transport (UOT), which relaxes the strict requirement of exact distribution matching. This relaxation enhances robustness to outliers, stabilizes training, and accelerates convergence. I will discuss both theoretical and empirical aspects: establishing an upper bound on distributional divergence under UOT and demonstrating improved performance on standard image generation benchmarks.
