# Introduction

Seyong Kim

Sejong University

# Call came, June last year from NRF

The mandate was "hold two meetings in Korea/UK during 18 month"

And "move forward with AI/ML in the chosen field"

# Actually, we have three meetings.

# Artificial Intelligence & Machine Learning for Fundamental Science

**First Virtual Meeting**

**Monday 15th November - Wednesday 17th November 2021**

**9am-11am (UK time) / 6-8pm (Korea time)**

**Organisers: Gert Aarts (Swansea University) and Seyong Kim (Sejong University)**

## Scientific motivation

In the past ten years or so the use of Artificial Intelligence and in particular Machine Learning has seen a dramatic increase in physics and astronomy. Image classification, signal processing and real-time data selection rely on the recognition of patterns in very large data sets, e.g., in the context of particle physics at the Large Hadron Collider or gravitational wave detection from neutron star/black hole mergers as seen by LIGO/Virgo. More recently, ML methods are also being developed to speed up numerical Monte Carlo approaches relying on high-performance computing (HPC), e.g., in numerical statistical mechanics and lattice Quantum Chromodynamics. Reversely, the methodology of statistical mechanics and the Monte Carlo approach (exactness, detailed balance, histogram reweighting, renormalization group) is being transferred to the ML community, to provide a fresh impetus to clarify the successes of the approach. Due to the similarities of questions asked, a cross-disciplinary approach in, e.g., image classification, links the physical and medical sciences, leading to unexpected connections between those usually separated disciplines. And finally, a longer-term goal is to fuse ML and quantum computing as quantum machine learning, which would lead to a dramatic speed-up and new, not yet explored, possibilities.

In order to build capacity, bridge gaps across disciplines, and develop a common framework, in this project we bring together researchers based in Korea and in the UK via three meetings: a virtual one, one hosted in Korea, and one hosted in the UK.

# Swansea University
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# DELEGATES SHARE EXPERTISE AT ARTIFICIAL INTELLIGENCE CONFERENCE

## News and Events

### News

#### 2022

October

September

August

July

June

May

April

March

February

January

#### 2021

#### 2020

#### 2019

#### News Archive



Friday 15 July 2022 12:12 BST

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Press Office

f.e.white@swansea.ac.uk

01792 602706

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Doctoral researchers and academics linked to two Centres of Doctoral Training (CDT) in Artificial Intelligence (AI) and Data

# Workshop for Korea-UK AI/ML Research in Fundamental Sciences

31 October 2022 to 4 November 2022
Sejong University, South Korea
Asia/Seoul timezone

Enter your search term

**Overview**

Scientific Programme

Timetable

Contribution List

Registration

Participant List

## Contact

✉ skim@sejong.ac.kr

✉ g.aarts@swansea.ac.uk

☎ 82-10-8904-3396

In recent years, Artificial Intelligence/Machine Learning finds increasingly wider area of applications. Many researchers who do large scale data handling and high performance computing in particle physics, astronomy and astrophysics, and computer science make rapid advances in applying AI/ML methods. Since similar questions are asked in these related fields, cross-disciplinary approach will benefit larger research communities. In this workshop, we would like to bring Korea and UK researchers in the fore-mentioned areas together, to share ideas/interests and to develop for collaborative efforts. As a longer term goal, a possibility of fusing quantum computing and AI/ML such as quantum machine learning will be explored.

This event is supported by National Research Foundation of Korea, UK Science & Innovation Network, and British Embassy Seoul.

🕐 **Starts** 31 Oct 2022, 09:00
**Ends** 4 Nov 2022, 17:00
Asia/Seoul

📍 Sejong University, South Korea
Conference Room 1/2, 12th floor AI Center, Sejong University (10/31st, Mon. - 11/2nd, Wed.)
Conference Room 1/2, Basement 1st Level, Gwang-Gae-To-Gwan, Sejong University (11/3rd, Thur. - 11/4th, Fri.)
Go to map

👤 **Gert Aarts**
Se Yong Kim

📎 There are no materials yet.

Baquet: Doore, National Museum of Korea (6pm, Nov. 2nd, Wed.)

- AI/ML applications in theoretical experimental particle physics

- AI/ML applications in astronomy and astrophysics

- AI/ML applications in computer science/mathematics

- AI/ML applications in related areas
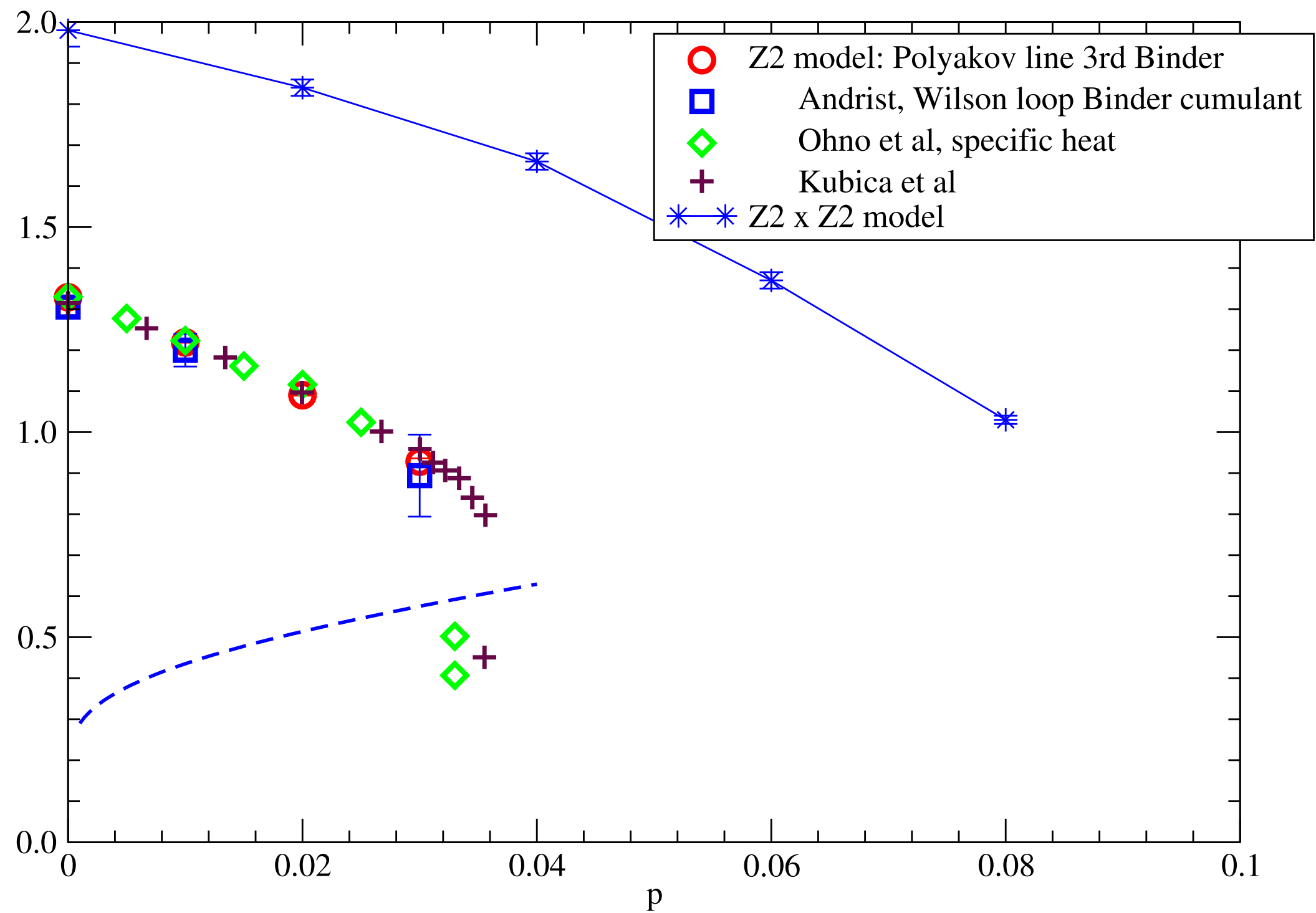
- My personal aim : do something about AI/ML and QC

- UK: Aberystwyth U., Bangor U., Bristol U.,

  Cardiff U., Swansea U.

- Korea: Atos Korea, CUPS/IBS, Korea U., KIAS, KISTI,

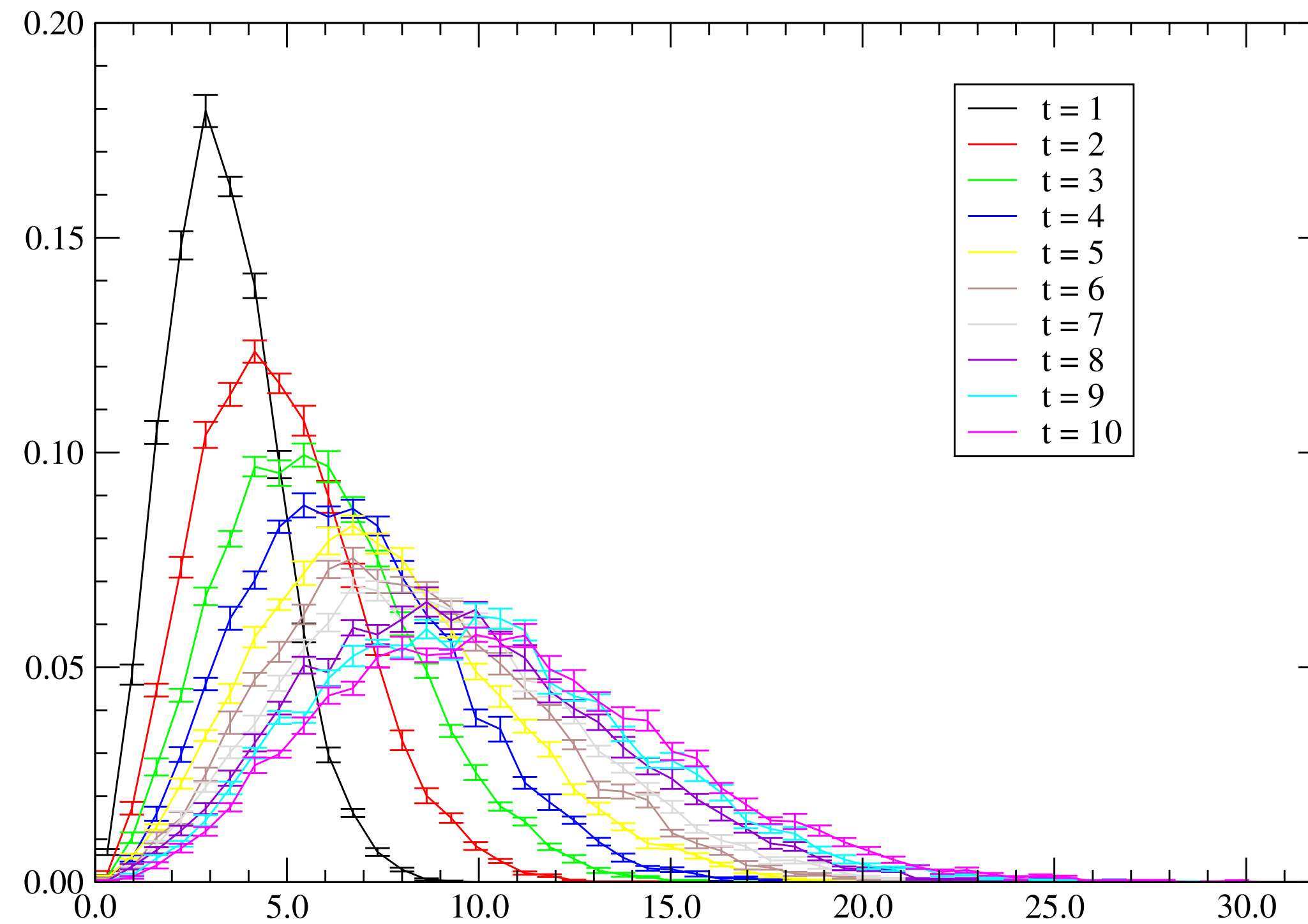  Promedius, Sejong U., U. Of Seoul, Yonsei U.,

This September,

Z2 model result based on $24^3$

Z2 x Z2 for $x = y = z = q = p/3$ case, on $12^3$

- ○ Z2 model: Polyakov line 3rd Binder
- □ Andrist, Wilson loop Binder cumulant
- ◇ Ohno et al, specific heat
- + Kubica et al
- ✳ Z2 x Z2 model

$N = 10^4$, $\eta = 0.4/t$, $\kappa = 8.0$

$dt = 0.01$

- $t = 1$
- $t = 2$
- $t = 3$
- $t = 4$
- $t = 5$
- $t = 6$
- $t = 7$
- $t = 8$
- $t = 9$
- $t = 10$

I arrived last Monday night, and am still horribly jet-lagged

# Participation from

# Help from

- Prof. Oh Saehanseul, Prof. Kim Hyunsoo, Prof. Kim Yongsun, Mr. Noh Sol, Mr. Ko Sanghyeon (particle/nuclear physics group, Sejong U.)
- Prof. Park Inkyu (U. of Seoul), Prof. Kim Yeongduk (IBS), Prof. Yi Piljin (KIAS)
- Prof. Baik Sungwook, Prof. Eom Jong-Hwa, Prof. Chun Seung-Hyun, Prof. Kim Keun Soo, Prof. Hong Suklyun, Prof. Jang Yoon, Mr. Lee Seung-Joon, Mr. Oh Donghwan (Sejong U.)
- Prof. Maurice Van Putten (Sejong U.), Prof. Lee Donghun (Korea U.), Mr. Kim Mingyu, Mr. Jeong Jinhoon (Promedius)

- Prof. Gert Aarts, Ms. Roz Toft (Swansea U.)
- Ms. Hyeyoung Kim, Mr. Gareth Davies (UK embassy, Seoul)

# Thank you,
# enjoy the workshop!