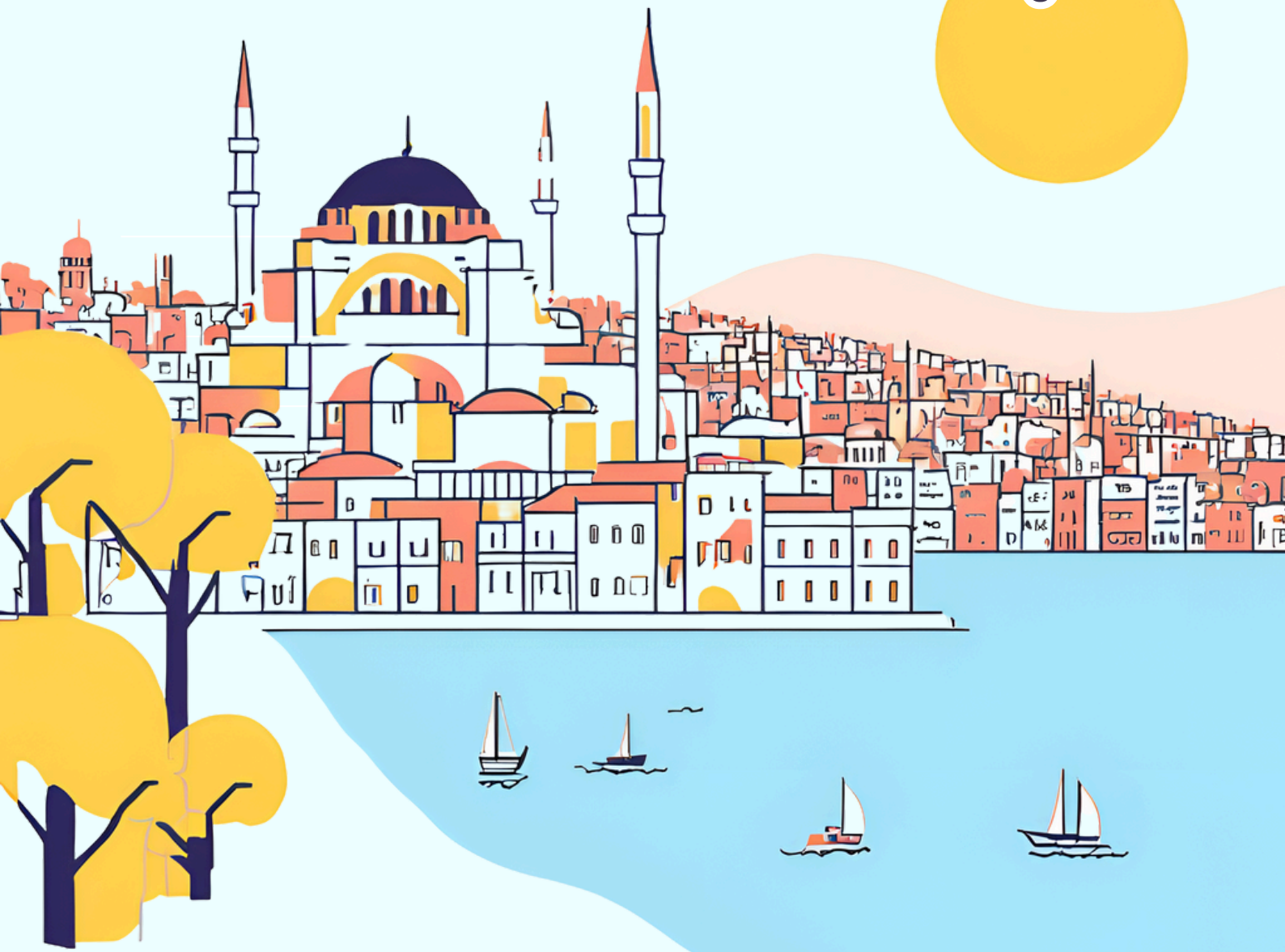
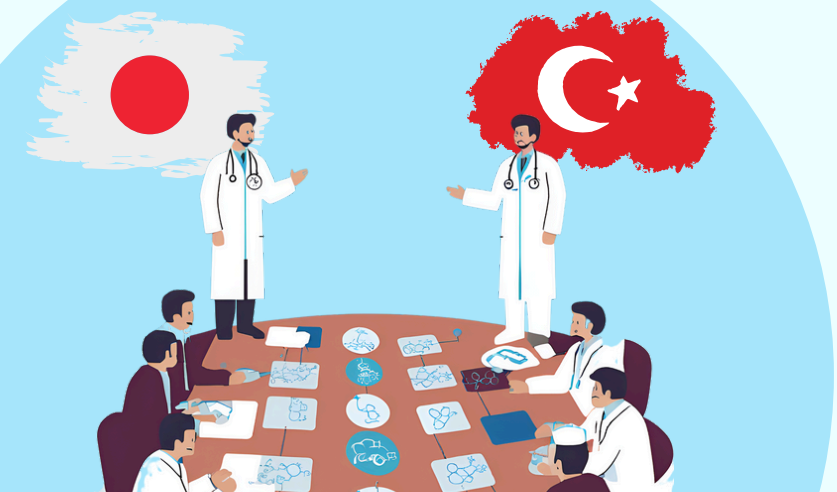
Japan–Turkey Collaborative Symposium on Magnetism



June 29–30, 2024

Koç University, Istanbul, Turkey



Program

June 29

9:30-9:45

A01

"TÜBİTAK-JSPS collaboration project between Koç and Tohoku Universities: work packages and project deliverables"

Mehmet C. Onbasli, (Koc University)

We present and overview of the project structure, aims, work packages, timeline, tasks, share of responsibilities, and project deliverables. We identify the potential deliverables of the year 2024.

9:45-10:00

A02

"Magnetophotonic Microcavity Showing Magnetic Domains"

Taichi Goto, (Tohoku University)

Magnetooptical device using magnetic domains have attract many interests because of its quick response and large diffraction angle. To develop these devices, we grew all-garnet magnetooptical microcavity using rf ion-beam sputtering, showing nano-scale magnetic domain and a large Faraday rotation angle.

10:00-10:15

A03

"Molecular beam epitaxy and pulsed laser deposition of magnetic oxides and transition metal Dichalcogenides"

Mehmet C. Onbasli, (Koc University)

We present experimental results on the MBE and PLD growth on TMD and oxide magnetic layers for spintronic materials and device research. We also present electromagnetic FDTD model studies and experimental MBE growth results for 2D superconducting single photon detectors with high absorption efficiency.

10:15-10:30
A04

“Two-Dimensional Periodical Structure Using Yttrium Iron Garnets and Cu”

Kanta Mori, (Tohoku University)

Two-dimensional hexagonal lattices of copper disks in a yttrium iron garnet (YIG) film create orientation-dependent magnonic crystal modes. The band gaps are notably deep and wide. Adjusting the incident angle of spin waves results in a noticeable frequency shift. These findings match well with finite integration technique calculations, contributing to the understanding of ultralow spin-wave damping in YIG.

10:30-10:45
A05

“Growth of Bi_2Te_3 using Molecular Beam Epitaxy”

Ebrahim Zahrabi, (Koc University)

We present the growth of Bi2Te3 using molecular beam epitaxy. We optimized the substrate temperature, Bi K-cell and Te K-cell temperatures, Bi:Te flux ratios, film thickness and strain, and Sb dopant concentration to achieve zero or minimal secondary phases and near-perfect single crystal structures for films with 8-15 nm thicknesses.

10:45-11:00
A06

“Nonlinear Interferometer Device Using Yttrium Iron Garnet”

Dan Shabaev, (Tohoku University)

We have designed a new logic device utilizing the nonlinear response of spin waves. This device employs a racetrack-shaped resonant structure made of yttrium iron garnet (YIG). The response characteristics of spin waves in this structure demonstrate significant potential for innovative applications in logic devices. The YIG material enables efficient manipulation of spin wave properties due to its excellent magnetic characteristics, paving the way for advanced spintronic applications.

11:00-11:15
Break

11:15-11:30
A07
“Effect of defects in monolayer hexagonal Boron Nitride on their electronic and magnetic properties”
Kerem Anar
We used density functional theory to calculate the equilibrium crystal structures of monolayer pristine and defective h-BN. We identify the defect type and concentration dependence of the formation energies, electronic band structures, spin resolved density of states and Raman spectra of defective h-BN.

11:30-11:45
A08
“Skyrmion logic gates and circuits for low energy nonvolatile nanoelectronics”
Arash Mousavi, (Koc University)
We used micromagnetic models to design and analyze Skyrmion based Boolean logic gates and circuits. The circuits have been found to consume lower energy than CMOS counterparts if the Joule heating is minimized. We discuss the potential for elimination of Joule heating using FeGeTe compunds.

11:45-12:00
“Closing Talk”
Taichi Goto (Tohoku University)

12:00-13:45
Lunch

13:45-17:00
Campus Tour & Lab Tour

18:00-20:00
Dinner

June 30

10:00-12:00
Meeting with Professors
Mehmet C. Onbasli, and Taichi Goto

We will discuss the following topics: the progress in the fabrication of two-dimensional material samples, the advancements in the measurement setup, the schedule for the upcoming symposium in Tohoku, Japan, and the timeline for the next visit of the Japanese group to Turkey.