



Welcome to Nagoya Workshop!

**Shingo Kazama
(KMI, Nagoya University)**

Welcome to Nagoya

Thank you for coming to our first workshop, the Nagoya Workshop on Technology and Instrumentation in Future Liquid Noble Gas Detectors

This workshop is held to

- Share the techniques and knowledge across experiments and fields, especially for the future liquid noble gas detectors.
- Get involved in discussions, ask questions, share your ideas
- Initiate new collaborations



Welcome to Nagoya

This workshop focuses on the following topics:

Physics program of future direct dark matter searches

New detector design and Novel TPCs: single-phase TPC, solid-Xe TPC, hermetic TPC, electrodes, and etc

New photosensors and charge readout: PMT, SiPM and etc

Novel purification for radioactive and non-radioactive impurities

Accidental coincidence and single-electron backgrounds





Kobayashi-Maskawa Institute for the Origin of Particles and the Universe





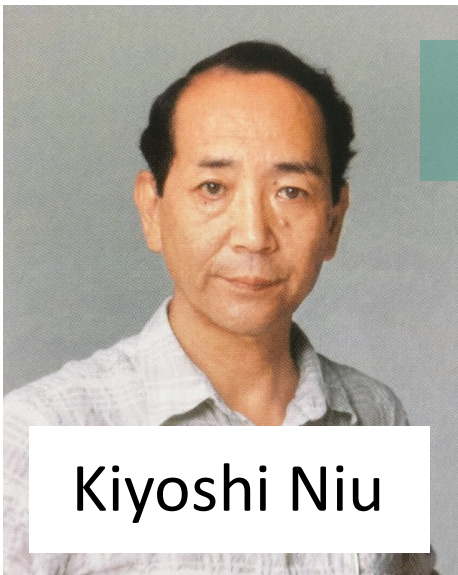
Sakata model
MNS matrix

Shoichi Sakata



X-ray astronomy

Sachio Hayakawa



Nuclear emulsions

Kiyoshi Niu



Kimio Niwa

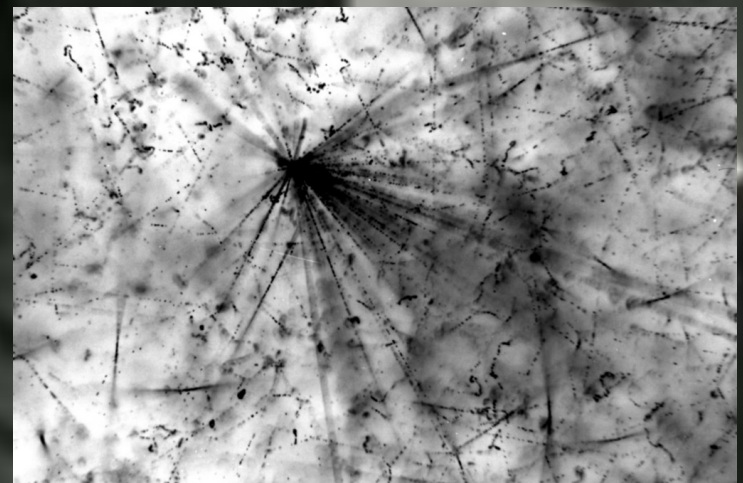
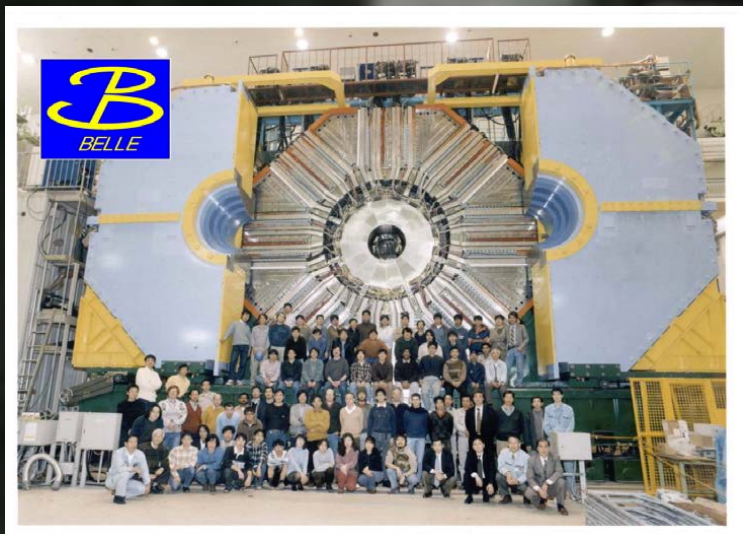
Kobayashi-Maskawa Matrix



© The Nobel Foundation
Photo: U. Montan
Makoto Kobayashi

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Photo: U. Montan
Toshihide Maskawa

- 1955 Sakata Model for hadrons
- 1962 Maki-Nakagawa-Sakata Matrix
- 1965 The first X-ray rocket in Japan
- 1971 Kyoshi Niu found charm quark event in CR.
(1974 Charm quark was detected at SLAC & BNL)
- 1973 Kobayashi-Maskawa matrix**
- 2000 Tau neutrino discovery (DONUT at Fermilab)
- 2001 CP symmetry breaking (Belle at KEKB factory)
- 2008 Nobel prize for Kobayashi-Maskawa matrix**
- 2010 Establishment of KMI**
- 2010 Observation of a first tau neutrino (OPERA)
- 2012 Discovery of Higgs particle
- 2015 The fifth tau neutrino (OPERA)



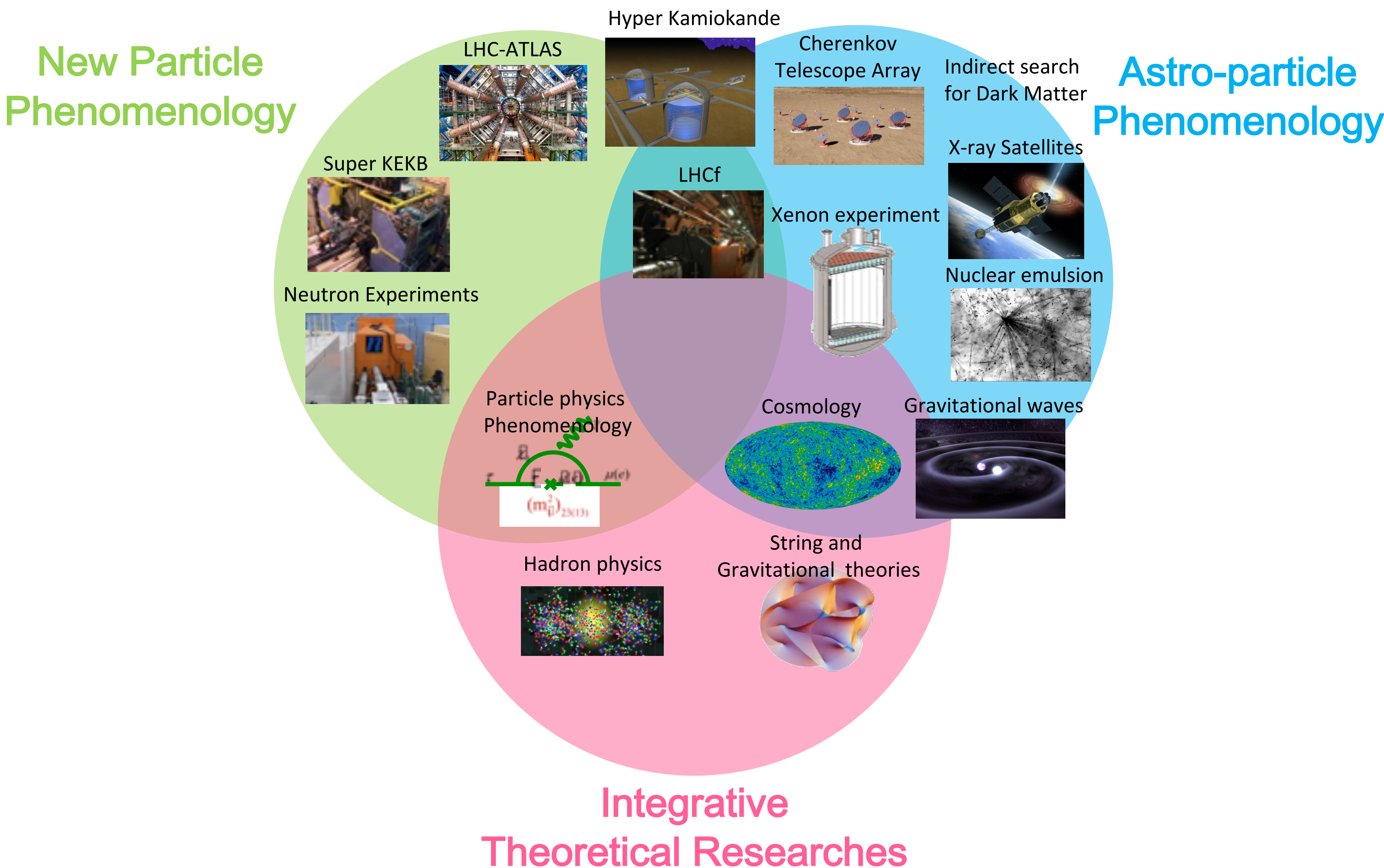
The image is a collage of physics-related content. At the top, a 3x3 matrix is shown with trigonometric and complex exponential terms. Below it, the CKM matrix V_{KM} is represented as a 3x3 matrix of V_{ij} elements. In the center, a black circle contains the text 'Dark Universe'. To the right of this circle, a bracket groups three terms: 'Dark Energy', 'Dark Matter', and 'Missing anti-matter'. The background features particle tracks with labels like τ , μ , $\tilde{\nu}_\tau$, $\tilde{\nu}_\mu$, π^- , K^+ , π^+ , and e^- , along with a W boson symbol.

$$\begin{pmatrix} \cos \theta_1 & -\sin \theta_1 \cos \theta_3 & -\sin \theta_1 \sin \theta_3 \\ \sin \theta_1 \cos \theta_2 & \cos \theta_1 \cos \theta_2 \cos \theta_3 - \sin \theta_2 \sin \theta_3 e^{i\delta} & \cos \theta_1 \cos \theta_2 \sin \theta_3 + \sin \theta_2 \cos \theta_3 e^{i\delta} \\ \sin \theta_1 \sin \theta_2 & \cos \theta_1 \sin \theta_2 \cos \theta_3 + \cos \theta_2 \sin \theta_3 e^{i\delta} & \cos \theta_1 \sin \theta_2 \sin \theta_3 - \cos \theta_2 \cos \theta_3 e^{i\delta} \end{pmatrix}$$
$$V_{KM} = \begin{pmatrix} V_{ud} & V_{us} & V_{ub} \\ V_{cd} & V_{cs} & V_{cb} \\ V_{td} & V_{ts} & V_{tb} \end{pmatrix}$$

Dark Universe

- Dark Energy
- Dark Matter
- Missing anti-matter

Beyond Kobayashi-Maskawa.



- Nagoya group's activity for direct dark matter experiment is selected as an Advanced International Research Unit
- Prof. Marc Schumann is co-PI of this research unit.



Some Information from LOC

Some remarks about the logistical arrangements:

- **Network:** Please use eduroam or following network (only 30 people can access). If you cannot access both of them, please let us know.

SSID: SPWH_L13_44E03E

Password: 2sX65jM4

- **ZOOM connection:** Please connect to zoom when you present
<https://us06web.zoom.us/j/81725397164?pwd=5imb5PU5WW4adRmjCIE5QjHdHtbD6K.1>
Meeting ID: 817 2539 7164
Passcode: 936358

- **Coffee break:** just in front of this room

- **Group photo:** We will take a group photo before lunch time today

- **Poster session:** The poster session will be held in front of this room (ES635) this evening. Light meals and drinks will be served.

- **Slide:** Please upload the slides to the following Google Drive before presentation.

<https://drive.google.com/drive/folders/1dBfuGVWd7Es1QdMA3x136N5PBmBbvEiP>

- **Presentation:** Each speaker is allocated 30 minutes, comprising a 25-minute presentation followed by a 5-minute Q&A session.

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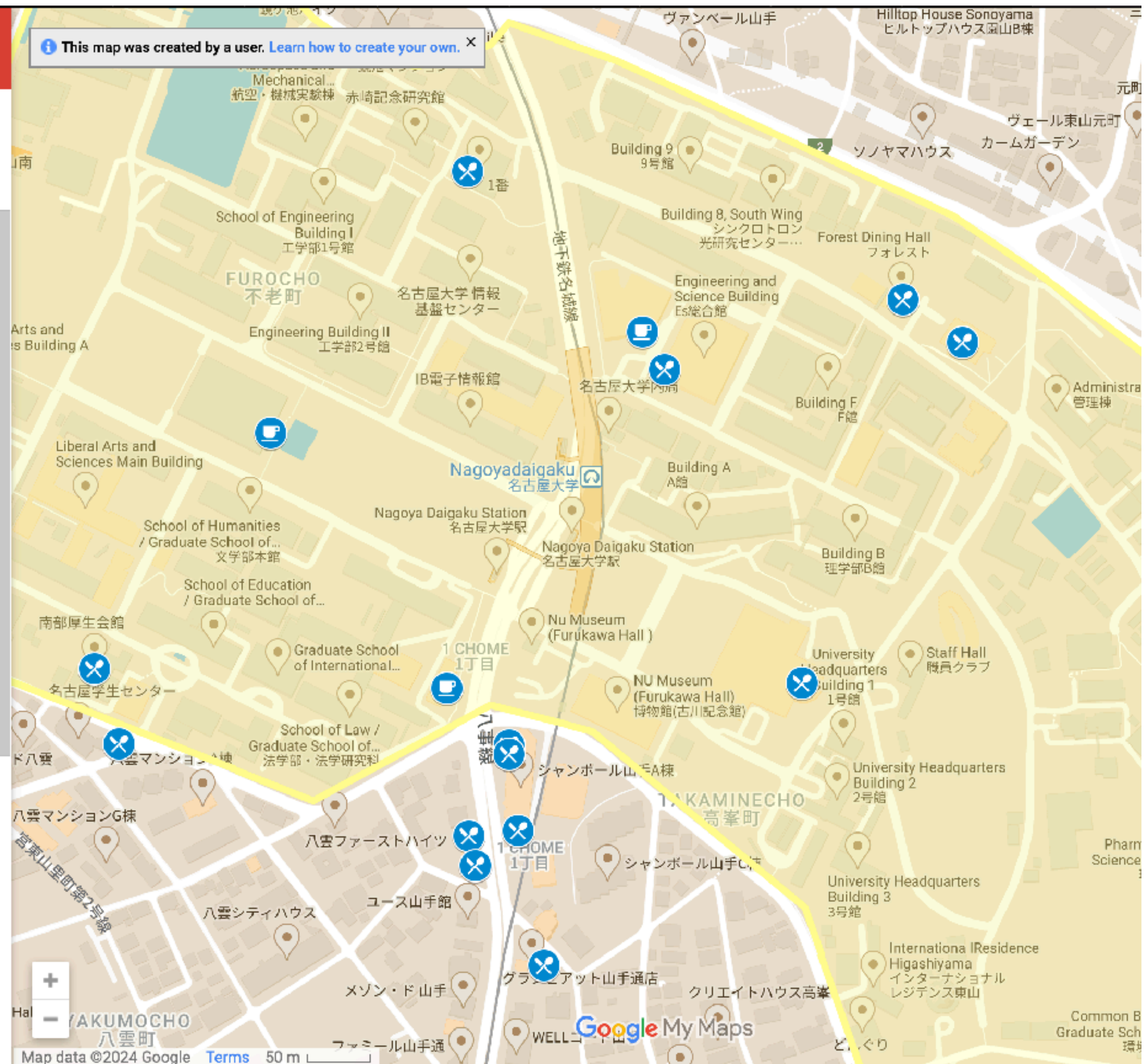
ICRC2023 Venue

Foods on Campus

- Chez Jiroud (Restaurant)
- "Hana-no-ki" (Restaurant)
- Hokubu Shokudo (North Canteen)
- Universal Club (Restaurant)
- Nambu Shokudo (South Cafeteria)
- Dining Forest (Canteen)
- Seattle Express (Cafe)
- Café Blanc
- Starbucks Coffee

Foods outside Campus

- Dhom Dhadaka
- Pion (not meson but Korean BBQ)
- Haloki
- Cafe Mountain
- Mega Kebab
- Hoja Nasreddin
- Yamate Cafe
- Tarkari
- Syunsai Cafe Oteate
- Gran Piatto
- musubi

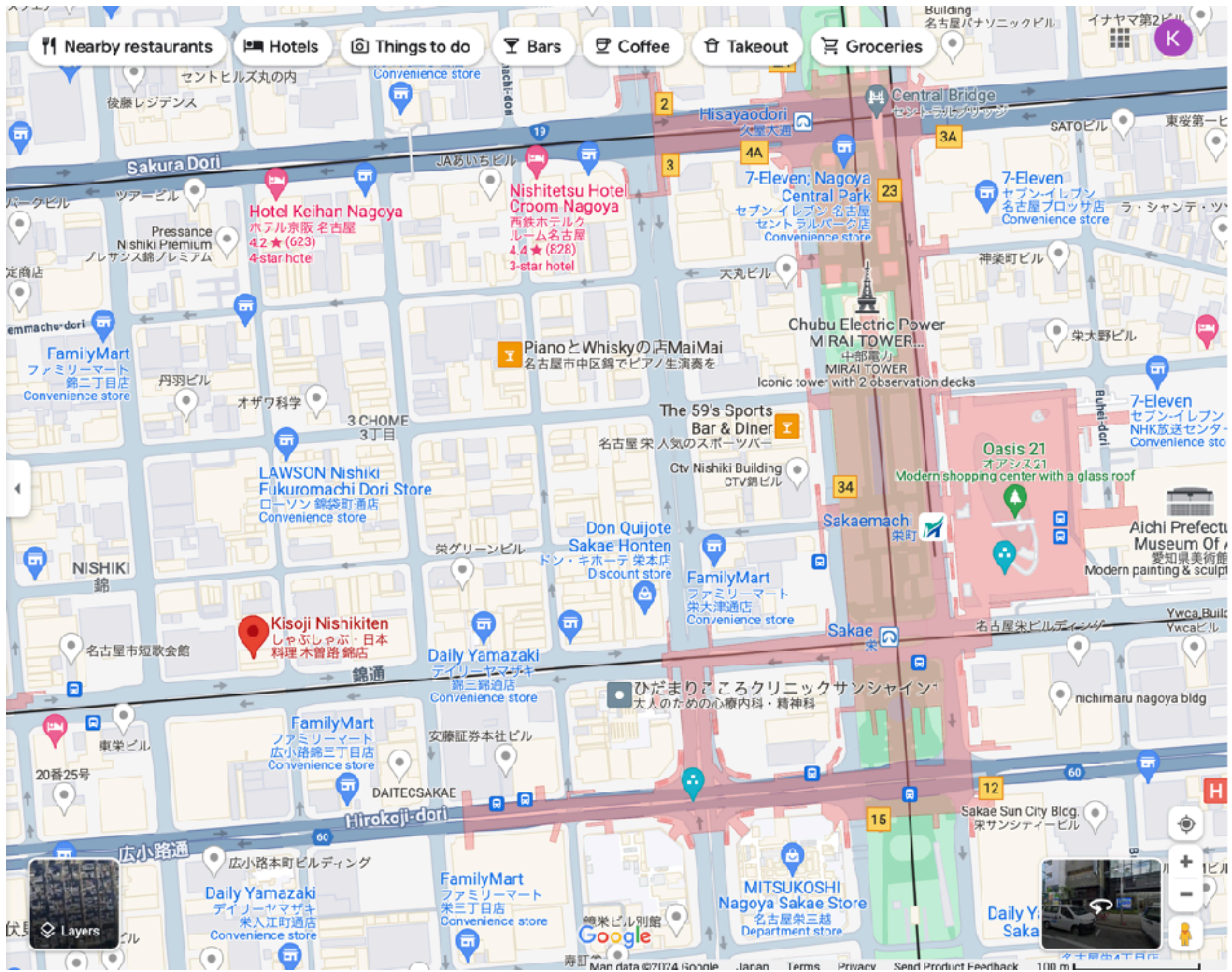


This map was created by a user. [Learn how to create your own.](#)

Map data ©2024 Google

Dinner

- **Fee:** Please pay 9000 Yen in cash
- **Location:** [Kisoji](#) restaurant near Sakae station at 7:30 PM





Enjoy the workshop!