JAPANESE PLANETARIUMS AND THE IPS 2026 FUKUOKA

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Figure 1. The Zeiss Jena, Universarium 23/3 at Akashi Municipal Astronomical Museum, installed in 1960, is the oldest planetarium machine still in operation in Japan. *Courtesy of Takeshi Inoue*

INTRODUCTION

The IPS conference will be held in Fukuoka City in June 2026. It will be the first time in 30 years since the IPS conference in Osaka in 1996 that it will be held in Japan. Just before that, at the IPS Florida conference in 1994, a Sake party was held near the venue to encourage people to participate in the Osaka conference, which contributed to raising awareness of Japan. In 1995, the author and Kimberly Ayers wrote an article on the general situation of planetariums in Japan, which was published in the Planetarian. The current situation of planetariums around the world, including Japan, is described in detail on Daniel Audeon's website "World Wide Planetarium" (https://planetariums-database.org/).

Thirty years is a long time. During this time, the situation surrounding planetariums in Japan has progressed greatly. Many digitalized science programs have been produced, and people's interest in the universe seems to have increased. The author feels that there is a deeper understanding of the world of astronomy compared to 30 years ago.

This paper describes the current state of planetariums in Japan and their close relationship with Japan's astronomical culture.

1. Overview of Planetariums in Japan

The first planetarium in East Asia was installed at the Electric Science Museum in Yotsubashi, Osaka in 1937, which marked the beginning of planetariums in Japan. The following year, in 1938, it was installed in Yurakucho, center of Tokyo. It can be said that Japan showed extraordinary interest in planetariums in the 1930s. At the end of World War II, the planetarium in Yurakucho was burned down in an air raid by the US military. However, the Osaka machine survived the war and continued to fight alone as Japan's only planetarium until the mid-1950s. In the 1950s, Goto Optical MFG, Chiyoda Optical (now Konica Minolta Planetarium), Nishimura Manufacturing, Kowa, and others began producing optical planetariums imitating Zeiss or Morrison type starballs. Now, there are 300 planetariums throughout Japan, and the machines are being updated one after another.

2. Goto and Minolta

Goto Optical MFG was founded in Tokyo in 1926 and was a company that mainly manufactured astronomical telescopes. The predecessor of Chiyoda Optical was founded in 1928, and became Minolta Camera Co. Ltd in 1962, and Konica Minolta in 2003. It is legendary that around 1958, when Zeiss's ZKP-1 from East Germany was delivered to Suidoyama in Gifu City, Tadamichi Yoshida, the developer of Goto Optical MFG, and Masasuke Nobuoka visited the company every day and thoroughly studied it. Minolta's pioneering product was the Nobuoka-type I delivered to Kohshien Hanshin Park in 1958, and Goto's pioneering product was the M-1 type delivered to Asakusa Shinsekai in 1959. Since then, the two companies have competed with each other for a long time, and to date, more than 300 machines have been delivered inside Japan. Both companies are sensitive to the trends of the times, and in the mid-1980s, tilted planetariums became common, and

Figure 2. A 1965 Goto M-1 still in operation at Tokyo University of Marine Science and Technology. *Photo by author.*

Figure 3. Members of high school and university astronomy clubs show off their homemade planetariums at school festivals. A small planetarium screening by students from Tokyo Mirai University. *Photo by author.*

from around Y2k, digital systems became common. Goto also has been producing full dome projectors with fish-eye lens since the late 1960s and was a pioneer in this field.

3. Numerous attempts made in Japan

According to Onishi (2014), after the WW2 in Japan, the Egami type (1947), Kochi type (1950), Kaneko type (1950), Onishi type (1951), Kowa type (1959), Nishimura type (1960), etc. were made. Since then, the dream of making planetariums has continued to be pursued by Pentax (1990) and Takayuki Ohira (1994), and a lot of university students. There are also more than ten operators of mobile planetariums.

If you want to see a vintage planetarium in Japan, the Zeiss II Planetarium that was in the Osaka Electric Science Museum is now on display at the Osaka City Science Museum. The oldest machine made by Goto is the S-3 type at Tokyo University of Marine Science and Technology, which is still in use and is maintained by students. The Zeiss IV at the Tokyu Bunka Kaikan, which opened in Tokyo in 1957, is on display in working order at the Cosmo Planetarium Shibuya. The Nagoya City Science Museum also exhibits the Zeiss IV, the Kaneko type pinhole planetarium, Digistar II projector, and related materials. In Akashi, a Zeiss Jena 23/3 made in 1960 is in use as the main star ball. At Shoganji Temple( ) in Tokyo, a prototype made by Pentax is still in use in 8m dome.

The fact that so many attempts have been made may be characteristic of Japan. Japanese people's astronomy enthusiasm has continued since long before World War II, and in 1908 the Astronomical Society of Japan (ASJ), which allows ordinary people to become members, was founded, and in 1920 the Oriental Astronomical Association (OAA), the oldest amateur organization, was founded. This is the same as the relationship between the Royal Astronomical Society (RAS) and the British Astronomical Association (BAA) in the UK. In addition, 2026 will mark the 100th anniversary of the opening of Japan's first public observatory. The first was the Kurashiki Observatory, and astonishingly, there are now said to be as many as 400 public observatories across Japan.

Many of these attempts have been accomplished purely by Japanese people, a testament to Japan's reputation as a nation founded on science and technologies.

4. Background of Japanese citizens' support for planetariums

In Japan astronomy is taught to 4th and 6th graders in elementary school and 3rd graders in junior high school. There are many amateur astronomers, who conduct observations and research (at the level of publishing papers in academic journals) in a variety of fields.

There are two commercial magazines that focus on astronomy and astrophotography as a hobby, and their pages are filled with informative articles written by professional writers and beautiful astronomical photographs.

The website of the Association of Lunar and Planetary Observers in Japan(ALPO-J) features planetary images submitted from all over the world, attracting worldwide attention. This is just one example, and observations of meteors, comets, occultations, and variable stars are also conducted worldwide. There are also many amateurs active in searching for novae, comets and asteroids. When there is a total solar eclipse, there are no less than 1,000 enthusiasts who travel anywhere in the world. Countless celestial photographs are taken, and when a comet or meteor shower approaches, social media is abuzz with a variety of excitement. With such a population, Japan is the world's leading astronomy power. It is not surprising that there are 300 planetariums. Another organization whose purpose is astronomy education is "Japan Public Observatories Society" (JAPOS). There is also a large organization called the "Japanese Society for Education and Popularization of Astronomy" (JSEPA), and "Astronomical Society of Japan" (ASJ) also has an Astronomy Education Committee. In addition, the "National Astronomical Observatory of Japan" (NAOJ) and the "Institute of Space and Astronautical Science" (ISAS) also conduct their own outreach activities, plus there are 300 planetariums! Japanese people probably have the most opportunities in the world to come into contact with astronomy and space information. IPS will be held in Japan, the world's leading astronomy powerhouse. We hope you will take this opportunity to enjoy "Japan, the Nation of Astronomy."

Figure 4. A performance of Night on the Galactic Railroad at Galaxcity Tokyo. The performers and the images projected on the dome become one, and the story unfolds. The accompanist penetrates the audience, successfully increasing the sense of unity with the audience. *Photo by author.*

5. Planetarium Culture in Japan

Planetariums open to the public offer a variety of programs, including programs for the general public, educational programs for elementary and junior high school students who visit planetariums as part of their school classes, programs for the emotional education of preschoolers, and various special programs. These programs include lectures by invited researchers, concerts by invited musicians, theater performances, and special programs that combine theater with images projected on the dome. Galaxity in Tokyo, where I work, has made a challenging attempt to perform Kenji Miyazawa's classical work "Night on the Galactic Railroad" using the traditional Japanese art of Nohgaku. The accompaniment is made up of traditional Japanese instruments such as the biwa and sho, as well as the cello, piano, and percussion. Similar attempts are made in many planetariums. This shows that planetariums are recognized by Japanese people as part of society and culture, just like community centers or schools. In recent years, the production of digital full-dome images has also become popular. Planetarium programs featuring animated characters, which have come to be recognized as part of Japanese culture, are gaining popularity. Short film contests are also held regularly, with the number of submitted works increasing every year.

6. Current state of planetariums in Japan

As of 2025, there are more than 300 planetariums in operation in Japan, both large and small. One of the characteristics of optical planetariums since 2000 is the increase in the number of stars. Goto's CHIRON and Ohira Tech's MEGASTAR-IIA are registered in the Guinness World Records.

There is no other country in the world with three optical planetarium manufacturers. There are also many digital planetarium developers. There are Goto's Virtualium X, Konica Minolta's Mediaglobe series, MITAKA created by the National Astronomical Observatory of Japan, and StellaDome Pro by AstroArts, which developed from a PC planetarium.

Amaterasu, a dome video platform by Orichalcum Technologies, provides encoders free of charge and is highly valued by video creators.

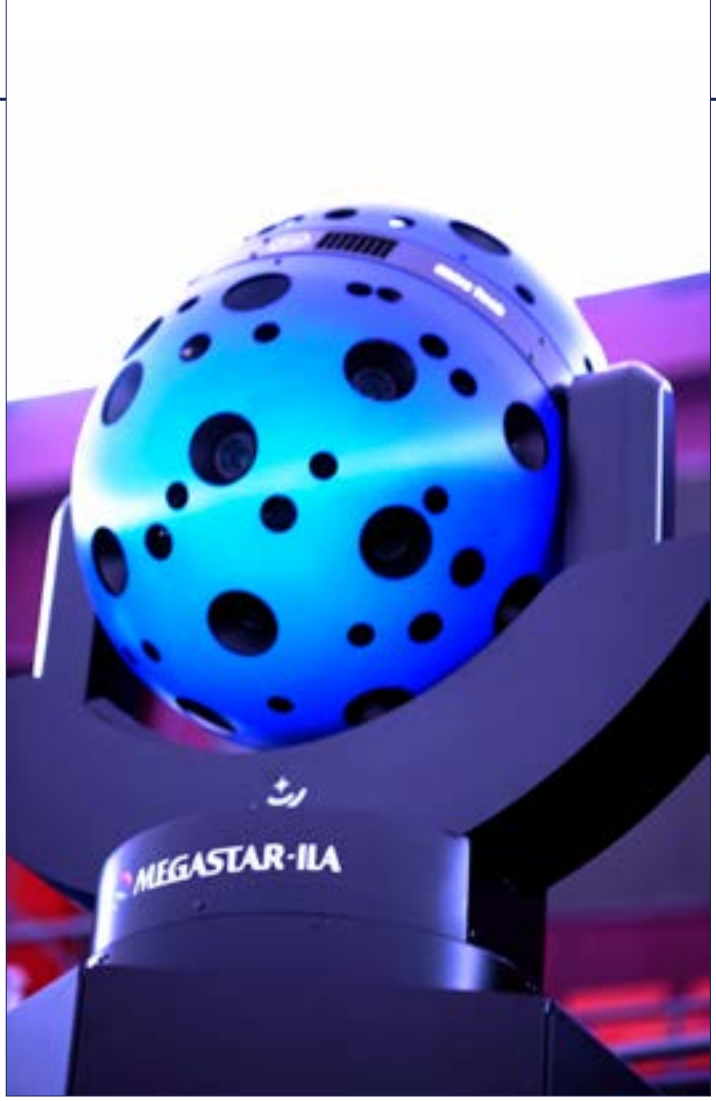

Figure 5. MEGASTAR II-A at Hamagin Space Science Center Yokohama can project 700 million stars, and was registered in the Guinness World Records for 2023. *Photo by Miwa Saito.*

The so-called LED dome, a completely new type that emits light by itself, has the potential to open up new horizons. LED domes have already opened to the public in two theaters directly operated by Knonica Minolta at Nagoya and Yokohama. In addition, there are many video creators and distributors. We are looking forward to many demonstrations at IPS 2026 Fukuoka.

We expect to see accelerated efforts to use the dome as a metaverse space. The Cosmoria Space Museum (*https://virtualspaceprogram.org/cosmoria*) may be the future of new museums and planetariums. It is only natural that we will seek new business models for it.

7. The Significance of IPS in Fukuoka

As mentioned in Section 4, the Japanese people continue to have a strong interest in astronomy and space. I hope that astronomy educators, not just planetarian around the world, will take an interest in the situation in Japan. And the IPS meeting is a great place to get a glimpse of that situation. LOC is working hard to develop plans to make the IPS meeting an ideal place to learn not only about trends in the planetarium industry, but also about the activities of JAPOS, OAA, JSEPA, the National Astronomical Observatory of Japan, and the

(Above) Figure 6. Planetarium Yokohama uses a self-luminous LED dome to show various video programs and constellation commentary programs. No matter how bright it is, there is no noticeable loss of contrast due to stray light. *Courtesy of Konica Minolta Planetarium.* (Right) Figure 7. The Fukuoka City Science Museum, which will be the venue for IPS2026 Fukuoka, is one of the largest planetariums in Kyushu, boasting a diameter of 25m and a seating capacity of 220. *Courtesy of Fukuoka City Science Museum.*

Institute of Space and Astronautical Science, among others, in astronomy education and outreach in Japan.

8. IPS 2026 Fukuoka outline

LOCATION:

Fukuoka City Science Museum

Fukuoka International Center

Fukuoka International Exhibition Hall

DATES:

June 18-19: Full Dome Festival

June 20-21: Council Meeting

June 21: Welcome Reception

June 22-23: Opening Ceremony, Dome Session

June 22-26: Vender Demo, Paper Session, Social Event, Social Dinner

June 27: Post Conference Tour

Further information will be released at IPS 2026 Fukuoka website.

https://www.ips2026fukuoka.com/

The schedule is subject to change.

References

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The description of the history of planetariums in Japan in this paper owes much to Inoue 2023.