

**THE EDUCATIONAL ROLE OF THE MUSEUM: ENGAGING PLANETARY SCIENCES TO LOCAL COMMUNITIES.** Li. Y.<sup>1,2</sup> and Keleme, B.<sup>2</sup>, <sup>1</sup>Earth Sciences Department, Western University, London, ON, Canada, N6A 5B7, [yli2889@uwo.ca](mailto:yli2889@uwo.ca) <sup>2</sup>Learning Department, the Royal Ontario Museum, Toronto, ON, Canada, M5S 2C6

**The Educational Role of the Museum:** It has been said that the educational role is what leads the Museum moving forward [1]. The Royal Ontario Museum (the ROM), as one of the largest museums in North America with more than one million visitors per year [2], takes the responsibilities on educating the public and communities besides its world-class curation of artistic, cultural and natural specimens [2].

Serving communities who wish to visit but could not come to Museum due to various reasons has always been one of ROM's mandates. Three outreach programs, Travelling Planetarium, Travelling Edukits, and Travelling Exhibitions, are provided by ROM to communities such as schools, public libraries, city halls, and local community museums [3]. Travelling Planetarium as one of three pro-vides immersive planetary talks given by experienced teachers from the Museum. To provide high-quality experiences, the traveling program requires a portable planetarium (10-30 m in diameter) with the capacity to 40 people and a high-performance projector that is able to project stars, planets, constellations, solar system and galaxy in a high resolution. Given the reasons that 1) the equipment is too expensive and not affordable and profit-efficient to most of the organizers and 2) they have difficulty to find experienced planetary instructors, the ROM fulfills role and initiates the program.



**Figure 1 The Royal Ontario Museum.** The Royal Ontario Museum located in Toronto Ontario, Canada. It is one of the largest museums in North America and the biggest in Canada [2]. Photo taken by Y. Li

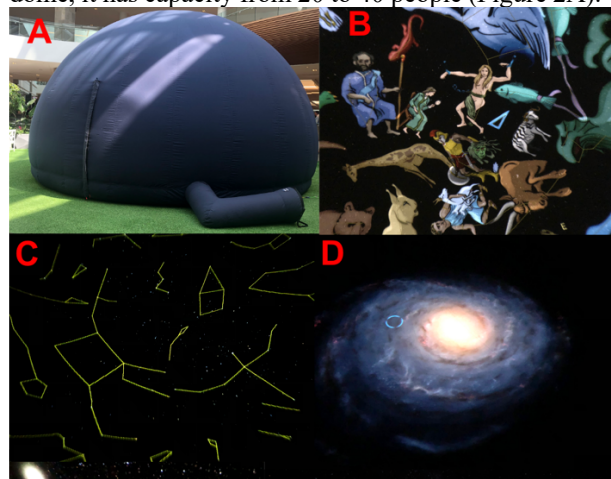
**The Travelling Planetarium Program:** McLaughlin Planetarium at the ROM at Queen's Park was closed in 1996 due to various reasons. A donation was made by Toshiba, and it allowed the Museum to purchase three portable planetariums from StarLab that

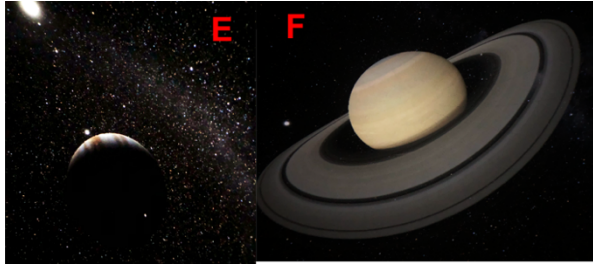
is a commercial planetarium provider. They were used until 2018 when the Museum raised enough funds for purchasing new ones. Now, three traveling planetariums from the Digitarium® are in use; two are used for the traveling program, and one is used for in-house classroom talks.

To emphasize the cultural diversity, the Travelling Planetarium Program is also able to present contents such as constellations from Indigenous culture as well as from other cultures. It promotes diversity, as one of the core values of the Museum, in the communities and raises public awareness of the minority groups.

The Travelling Program is open to book by schools and public facilities with a fee of \$1500 that helps to cover the traveling costs, instructors fee, and regular maintenance of the projector and planetarium domes. Other funding sources may also be applicable if the facility needs help to cover the cost. With the efforts of all people who devote to the program, so far, we reach 15 000 to 16 000 students a year tour traveling planetarium (Keleme B., the program coordinator). We also disclose spendings on the program so that donors and taxpayers know where the funding goes.

**The Travelling Planetarium and Talks:** The traveling planetarium is an inflatable dome that is manufactured with flame retardant fabric to rigorous NFPA – 701 Method 2 standards [4]. Air is constantly circulated in the dome with an inflation fan so that the dome stays inflated and provides a comfortable space for audiences. It is access friendly, and depending on the dome, it has capacity from 20 to 40 people (Figure 2A).





**Figure 2. The planetarium and the example of projection.** 2A shows the fully inflated dome in an event hosted by Erin Mills Shopping Mall Mississauga Ontario Canada in 2018 Family Day. The fully inflated dome is one floor high and have capacity up to 40 people. 2B and 2C shows constellation projection in the dome. They were the constellations that were in the sky at the time of presentation. Visible ones that can be easily seen with bare eyes include: Andromeda, Cassiopeia, Persus, Ursa Major, Ursa Minor and Cygnus, the giant swan. The projector can display artistic work as well as asterism connected by lines. 2D to 2F show example of astronomical object projection: The Milky Way Galaxy (blue circle denotes where the solar system is), the Jupiter in shadow, and Saturn and its magnificent ring system.

The Digitarium® enables high definition projections of daytime and nighttime sky on the earth. It simulates the earth-like environment and allows an immersive viewing experience for audiences. It provides high-resolution projections of the planets in the solar system, including their moons, from 360° viewing angle. Besides planets and stars, the Digitarium® is also program to show constellations in popular Roman culture as well as in other cultures as well, such as Indigenous, Asian, and Egyptian cultures (Figure 2).

In the planetarium, depending on the requests, we give 20 – 60 minutes presentations on a wide range of planetary science-related topics. We start from basic geology and astronomy about the earth rotation, day and night length variation, and season changes; then we move on to more sophisticated topics that introduce the eight major planets in the solar system plus Pluto and their compositions. If time allows, we will also present the ongoing and future space exploration projects, expected outcomes from these programs, and the contribution towards human's understanding of the universe.

Besides the immersive “in-dome” experiences, we also dedicate to provide the “take-home” experiences and encourage our audiences to make their own observations of the sky after the presentation. Herein, besides rigorous science, “what’s up tonight” is also another core component in our presentation. We introduce the astronomical objects that can be observed in the dark sky (without or with little aids such as binocular), including visible planets, constellations, and meteor shower, if possible. We introduce what time in a

day would give the best observation and what is to expect when observing. We also introduce the stories behind constellations as the stories were the interpretation of the sky from our ancestors. As this part is time-dependent, the contents are changed accordingly to ensure our audiences have the most up-to-date information.

**Feedbacks and the Future Plans:** We have received positive feedback from students, teachers, parents, and event organizers with increased demands on the program and repeated clients, according to the program coordinator, Keleme B. She dedicates to promote the program to broader audience groups and make it accessible to more people. In 2020, we wish to serve more community groups who have difficulty to access the museum and bring them unique learning experience of the planetary sciences.

Together the program and the people who work for it devote to engaging planetary sciences to the local communities, students, and people who love planetary sciences regardless of their races, sexes, ages, and professions. We do the best to entertain the audience with the astonishing figures and stories of astronomical objects as well as to inspire them with edge-cutting science discoveries and glorious space exploration of the human being from our ancestors to nowadays. We wish that, with help from the ROM, more people would be encouraged to explore their wildest dream of the universe.

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**References:** [1] Hooper-Greenhill, E. (1999), *The educational role of the museum*. Psychology Press. [2] Royal Ontario Museum Press release (2017): [ROM Announces Record-Breaking 1.35 Million Visitors Annual Attendance](#) (accessed in 2019); [3]The Royal Ontario Museum Website: [Travelling Programs](#) (accessed in 2019); [4] The Digitarium® Website: [domes](#) (accessed in 2019)