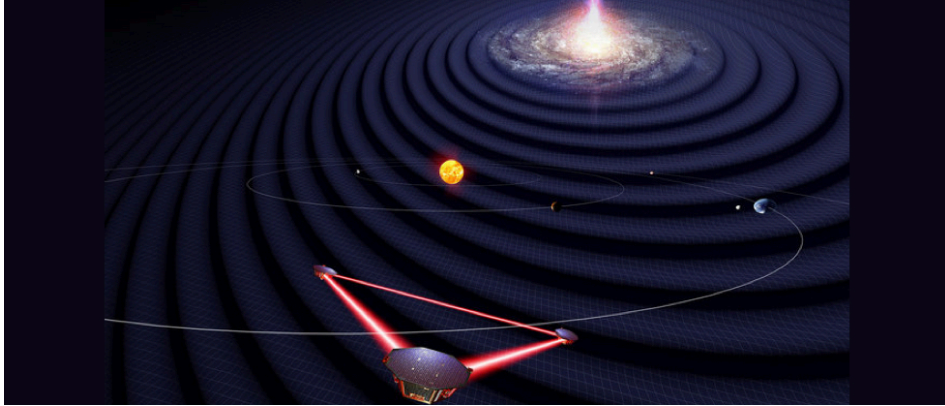


LISA Canada Workshop



Report of Contributions

Contribution ID: 0

Type: **not specified**

LISA Science Overview

Tuesday, April 27, 2021 8:00 AM (45 minutes)

LISA is a joint ESA/NASA mission that will provide the first view of the milliHertz gravitational wave sky, a region of the gravitational wave spectrum that is known to be rich with astrophysical sources. LISA is poised to fundamentally change what we understand about massive black hole birth, growth, and co-evolution, binary stellar evolution, cosmology, gravity, and the list goes on. There's just not enough time in 35 minutes to cover *all* of LISA's enormous discovery space, but we'll touch on some of the highlights.

Chair: Daryl Haggard (McGill U)

Co-Chair: Scott Oser (UBC)

Primary author: HOLLEY-BOCKLEMANN, Kelly (Vanderbilt U)

Presenter: HOLLEY-BOCKELMANN, Kelly (Vanderbilt U)

Session Classification: LISA Science Overview

Contribution ID: 1

Type: **not specified**

LISA Detector Overview

Tuesday, April 27, 2021 8:45 AM (45 minutes)

In this talk we address the measurement concept and the main experimental challenges for creating LISA, the first orbiting gravitational wave observatory, focusing on the the mHz frequency band that is only accessible from space. The task of using laser interferometry to measure the gravitational wave tidal deformation of a constellation of free-falling test masses is discussed, both in the context of heritage from the single-spacecraft LISA Pathfinder “Einstein geodesic explorer” mission and for the unique remaining challenges to be met by the full 3-spacecraft LISA observatory.

Chair: Daryl Haggard (McGill U)

Co-Chair: Scott Oser (UBC)

Presenters: MONDIN, Linda (ESA); WEBER, William Joseph (University of Trento)**Session Classification:** LISA Detector Overview

Contribution ID: 2

Type: **not specified**

Panel: LISA in Canada

Tuesday, April 27, 2021 9:35 AM (25 minutes)

In this panel discussion, Nora Lützendorf (ESA) and Martin Hewitson (AEI MPG) will be joined by Jess McIver (UBC), John Ruan (Bishop's U), and Huan Yang (U Guelph/Perimeter) as panelist to discuss paths for Canadian involvement in LISA, and exciting ways LISA science intersects with other physics and astro interests in Canada.

Moderator: Daryl Haggard (McGill U)

Chair: Will East (Perimeter)

Co-Chair: Saurya Das (U Lethbridge)

Primary author: Prof. HAGGARD, Daryl (McGill University)

Presenters: Dr YANG, Huan (University of Guelph); Prof. MCIVER, Jess (UBC); Prof. RUAN, John (Bishop's University); Dr HEWITSON, Martin (AEI MPG); Dr LÜTZGENDORF, Nora (ESA/STScI)

Session Classification: Panel: LISA in Canada

Contribution ID: 3

Type: **not specified**

Astrophysics Working Group

Tuesday, April 27, 2021 10:00 AM (30 minutes)

We'll introduce the idea of the Working Group structure in the LISA Consortium, and discuss our activities, and ways that we try to build opportunities for the LISA community to collaborate and work together. I'll try to make my comments brief, and would like to leave as much time as possible for discussion and questions.

Chair: Will East (Perimeter)

Co-Chair: Saurya Das (U Lethbridge)

Presenter: LARSON, Shane (Northwestern U)

Session Classification: Astrophysics Working Group

Contribution ID: 4

Type: **not specified**

Cosmology Working Group

Tuesday, April 27, 2021 10:30 AM (30 minutes)

The goal of the LISA Cosmology Working Group is to support and extend LISA cosmological science; to facilitate investigations of cosmological models that can be tested by LISA, and to develop methods of analysis to reveal or constrain these models. The main activities of the working group, to date, have been to organize projects and to hold workshops. Several of these investigation or methods projects have been adopted by the LISA Science Group as work packages, as “official LISA science”. A current project is a research white paper summarizing the state of the art in LISA cosmology. In this brief presentation, we will give an overview of the activities and science of the cosmology working group.

Chair: Will East (Perimeter)

Co-Chair: Saurya Das (U Lethbridge)

Presenters: NARDINI, Germano (Stavanger U); CALDWELL, Robert (Dartmouth U)

Session Classification: Cosmology Working Group

Contribution ID: 11

Type: **not specified**

Data Processing Working Group

Wednesday, April 28, 2021 8:00 AM (30 minutes)

The LISA Data Processing Group (LDPG) is in charge of the Science Ground Segment (SGS) contribution from the LISA Consortium. It is conducting a number of short and long term activities: Distributed Data Processing Center definition and organisation, data analysis logic, prototyping, collaborative tools, Initial Noise Reduction Pipeline and Simulation. In this talk, we will first present the scope of the LDPG and an overview of its activities. Then we will discuss possible contributions to the LISA SGS for new participants.

Chair: Huan Yang (U Guelph/Perimeter)

Co-Chair: David Morrissey

Presenters: PETITEAU, Antoine (APC Paris); BAKER, John (NASA Goddard)

Session Classification: Data Processing Working Group

Contribution ID: 12

Type: **not specified**

Data Challenge Working Group

Wednesday, April 28, 2021 8:30 AM (30 minutes)

In this talk, I will give an overview of the new LISA Data Challenges Group. The role of the group within the LISA Consortium, and its importance for the mission are going to be presented. At the same time, the current status and future planning, as well as a few highlights from the past, are going to be discussed.

Chair: Huan Yang (U Guelph/Perimeter)

Co-Chair: David Morrissey (TRIUMF)

Presenter: KARNESIS, Nikolaos (APC Paris/Aristotle U of Thessaloniki)

Session Classification: Data Challenge Working Group

Contribution ID: 13

Type: **not specified**

Highlights of Canadian research relevant to LISA - Parallel B

Wednesday, April 28, 2021 9:00 AM (25 minutes)

Maxence Corman (Perimeter): Constraining higher dimensions with MBHB merger events;
Anna Heffernan (AEI MPG/Guelph): Regularised self-force towards EMRIs;
Zhen Pan (Perimeter): EMRI formation in active galactic nuclei;
David Racco (Perimeter/Stanford): Cosmological GW backgrounds: from PBH to phase transitions;
Vasil Todorinov (U Lethbridge): Quantum Gravity effects on Gravity Wave detection

Chair: Huan Yang (U Guelph/Perimeter)

Co-Chair: Saeed Rastgoo (York U)

Presenters: HEFFERNAN, Anna (U Guelph/U C Dublin); RACCO, Davide (Perimeter/Stanford); COR-
MAN, Maxence (Perimeter Institute); TODORINOV, Vasil (U Lethbridge); PAN, Zhen (Perimeter Insti-
tute)

Session Classification: Highlights of Canadian Research Related to LISA

Contribution ID: 14

Type: **not specified**

Simulation Working Group

Wednesday, April 28, 2021 9:30 AM (30 minutes)

The space based GW detector 'Laser Interferometer Space Antenna' (LISA) will probe the low-frequency GW sources such as mergers between massive Black holes and compact binaries amongst others. To achieve its science goals instrumentation the interferometry that will measure the distance variations between freely falling test-masses is required to achieve picometer sensitivity in the given frequency range. The presentation covers an overview of the simulation of the main noises in the interferometry chain and first leg of the data processing to mitigate them.

Chair: Saeed Rastgoo (York U)

Co-Chair: Djuna Croon (TRIUMF/IPPP Durham)

Presenter: SHAH, Sweta (MPI AEI)

Session Classification: Simulation Working Group

Contribution ID: 15

Type: **not specified**

Fundamental Physics Working Group

Wednesday, April 28, 2021 10:00 AM (30 minutes)

I will first situate the role and workings of the LISA Fundamental Physics Working Group in the LISA Consortium. Then I will give an overview of its activities, both past, current and planned, and indicate how I think its scope will evolve in the coming years.

Chair: Saeed Rastgoo (York U)

Co-Chair: Djuna Croon (TRIUMF/IPPP Durham)

Presenter: HERTOOG, Thomas (KU Leuven)

Session Classification: Fundamental Physics Working Group

Contribution ID: 16

Type: **not specified**

Waveform Working Group

Wednesday, April 28, 2021 10:30 AM (30 minutes)

The waveform working group and work-package group host activities to provide waveform models that will underpin LISA's science goals. The scope includes diverse astrophysical sources, among them supermassive black holes, extreme-mass-ratio inspirals and white dwarf binaries, and a variety of computational approaches from analytical calculations to numerical relativity. A particular concern is that waveform models must be accurate enough for the high-precision science of LISA, and fast enough to be usable in practice.

Chair: Saeed Rastgoo (York U)

Co-Chair: Djuna Croon (TRIUMF/IPPP Durham)

Presenter: PFEIFFER, Harald (AEI MPG)

Session Classification: Waveform Working Group

Contribution ID: 17

Type: **not specified**

Overview of the LISA Consortium

Thursday, April 29, 2021 8:00 AM (30 minutes)

Presented will be an overview of the LISA Consortium. The different governing committees and scientific groups will be summarized. Information on membership and responsibilities for the LISA Consortium will be discussed.

Chair: Scott Oser (UBC)

Co-Chair: Pasquale Bosso (U Lethbridge)

Presenter: CHRISTENSEN, Nelson (ARTEMIS/Observatoire de la Côte d'Azur)

Session Classification: Overview of the LISA Consortium

Contribution ID: 18

Type: **not specified**

LISA Hardware and Opportunities for New Contributions

Thursday, April 29, 2021 8:30 AM (1 hour)

In the session “LISA Hardware and Opportunities for New Contributions”, Martin Hewitson will review the current Consortium hardware responsibilities, pointing out areas of uncertainty in the overall architecture, both in terms of mission architecture, technology development and responsibility. A discussion will follow.

Chair: Scott Oser (UBC)

Co-Chair: Pasquale Bosso (U Lethbridge)

Presenters: GEHLER, Martin (ESA); HEWITSON, Martin (AEI MPG)

Session Classification: LISA Hardware and Opportunities for New Contributions

Contribution ID: 19

Type: **not specified**

Meet the LISA Leadership Room #1: Prospects for Canadian Contributions to LISA Hardware

Thursday, April 29, 2021 9:35 AM (25 minutes)

Breakout session with Hardware WG chair Nora Lützendorf (ESA).

Chair: Jess McIver (UBC)

Co-chair: Daryl Haggard (McGill U)

Session Classification: Parallel session discussion: Meet the LISA Leadership

Contribution ID: 20

Type: **not specified**

Advocacy and Outreach Working Group

Thursday, April 29, 2021 10:00 AM (30 minutes)

The LISA Consortium Advocacy and Outreach Group (“AdvoReach” for short) supports and coordinates communications and advocacy about LISA amongst four main groups:

- (1) the Consortium itself, promoting regular exchange of information between the different science teams;
- (2) the gravitational-wave community, cooperating with scientists working on projects that span the gravitational-wave spectrum;
- (3) the wider astronomical community, particularly in areas of common, complementary science;
- (4) the non-scientific community, raising awareness of LISA amongst journalists, politicians and decision-makers, educators, students and the general public.

In this overview talk I will briefly highlight some of the many projects through which AdvoReach interacts with the above audiences (both face-to-face and via online engagement) and the many ways in which you can get involved in our AdvoReach activities.

Chair: Saurya Das (U Lethbridge)

Co-Chair: Jess McIver (UBC)

Presenter: HENDRY, Martin (U Glasgow)

Session Classification: Advocacy and Outreach Working Group

Contribution ID: 21

Type: **not specified**

Closeout

Thursday, April 29, 2021 10:30 AM (30 minutes)

Session Classification: Closeout

Contribution ID: 23

Type: **not specified**

Welcome

Tuesday, April 27, 2021 7:45 AM (15 minutes)

Primary author: Prof. MCIVER, Jess (UBC)

Presenter: Prof. MCIVER, Jess (UBC)

Session Classification: Welcome

Contribution ID: 24

Type: **not specified**

Highlights of Canadian research relevant to LISA - Parallel A

Wednesday, April 28, 2021 9:00 AM (25 minutes)

Miriam Cabero Müller (UBC): GWSkyNet for multi-messenger astronomy;
Kristen Dage (McGill U): The hunt for ultra-compact X-ray binaries in extragalactic globular clusters: lessons for LISA;
Evan Goetz (UBC): Applying LIGO-Virgo continuous gravitational wave analysis methods to LISA data;
Laura Sberna: Matter and third body effects in LISA binaries;
Nicholas Viera (McGill U): Canadian Multi-messenger Astronomy: a CFHT + GW190814 Case Study

Chair: John Ruan (Bishop's U)

Co-Chair: Jess McIver (UBC)

Presenters: GOETZ, Evan (UBC); DAGE, Kristen (McGill U); SBERNA, Laura (AEI MPG); CABERO MÜLLER, Miriam (UBC); VIERA, Nicholas (McGill U)

Session Classification: Highlights of Canadian Research Related to LISA

Contribution ID: 30

Type: **not specified**

Meet the LISA Leadership Room #2: Fundamental Physics and Cosmology

Thursday, April 29, 2021 9:35 AM (25 minutes)

Breakout session with Fundamental Physics WG chairs Nico Yunes (UIUC) and Philippe Jetzer, and Cosmology WG chairs Germano Nardini and Robert Caldwell (Dartmouth).

Chair: Saeed Rastgoo (York U)

Co-Chair: Djuna Croon (TRIUMF/IPPP Durham)

Session Classification: Parallel session discussion: Meet the LISA Leadership

Contribution ID: 31

Type: **not specified**

Meet the LISA Leadership Room #3: Waveforms and Astrophysics

Thursday, April 29, 2021 9:35 AM (25 minutes)

Breakout session with Waveform WG chairs Helvi Witek (UIUC) and Deirdre Shoemaker (UT Austin), and Astrophysics WG chair Shane Larson (Northwestern)

Chair: Will East (Perimeter)

Co-Chair: David Morrissey (TRIUMF)

Session Classification: Parallel session discussion: Meet the LISA Leadership

Contribution ID: 32

Type: **not specified**

Meet the LISA Leadership Room #4: LISA Data Challenge and Simulation

Thursday, April 29, 2021 9:35 AM (25 minutes)

Breakout session with data challenge and Simulation WG chairs Michele Vallisneri (JPL/Caltech), Luigi Ferraioli (ETH Zürich), and Sweta Shah (AEI MPG)

Chair: Scott Oser (UBC)

Co-Chair: Huan Yang (U Guelph/Perimeter)

Session Classification: Parallel session discussion: Meet the LISA Leadership

Contribution ID: 33

Type: **not specified**

Meet the LISA Leadership Room #5: Data Processing and Advocacy/Outreach

Thursday, April 29, 2021 9:35 AM (25 minutes)

Breakout session with Data Processing WG chairs John Baker (NASA) and Antoine Petiteau (data processing), Advoreach WG chairs Martin Hendry (Glasgow) and Kelly Holley-Bockelmann (Vanderbilt).

Chair: Saurya Das (U Lethbridge)

Session Classification: Parallel session discussion: Meet the LISA Leadership