presents

ONE WHOLE STEP FOR MAN

Songs of Space Travel

Music by David Bass, Jonathan Coulton, Andrea Gaudette, David Haines, Ruth Hertzman-Miller, Daniel Kallman, Bruce Lazarus, Tim Maurice, Brian May, Lauren Mayer, and Molly Ruggles

Directed by Sarah Eastman

Cambridge Science Festival 2019
Cambridge, Massachusetts
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to all our friends and neighbors
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Directed by Sarah Eastman

Music and Lyrics by David Bass, Jonathan Coulton, Andrea Gaudette, Richard Gaudette, David Haines, Ruth Hertzman-Miller, Christine Kallman, Daniel Kallman, Bobbi Katz, Bruce Lazarus, Tim Maurice, Brian May, Lauren Mayer, Meg Muckenhoupt, and Molly Ruggles

Piano Accompaniment .............................................. David Haines
Artistic Director .......................................................... David Bass
Producer ........................................................................ Sue Hall
Slideshow ...................................................................... Carla Procaskey
Logo Design ................................................................. Leo Sampaio

Saturday, 4/13/19, 3pm, Broad Institute
Sunday, 4/14/19, 3pm, Cambridge Main Library
Saturday, 4/20/19, 3pm, Peabody School
One Whole Step for Man: Singers and Artists

**NCFO Festival Chorus**
Emma Adler*
Emilija Baksys
David Bass
Abbe Cohen Dvornik
Katarina Dvornik
Luka Dvornik
Sarah Eastman
Chris Edel
Andrea Gaudette
Sanjukta Ghosh
Verity Gould
David Haines
Sue Hall*
Jim Hickey
Heather Hoffman
John Kernochan
Enid Kumin
Kathy Lindsay*
Rosemary Lindsay*
Glenn McElhoe
Jeff Moore
Arlene Olivero
Margaret Ormes
Mary Penniston
Ashmita Prajapati
Carla Procaskey
Megan Ringrose
Robert Ringrose
Susan Ringrose
Ruth Rogers*
Abigail Sheldon
Elizabeth Sheldon
Lindsey Smilack
Lilli Smith
Violet Smith
Ellen Sun
Yifei Sun
Yongtling Wang
Sally Wolfe
Andromeda Yelton
Aimee Yermish*

**Grade 1 Students of Inbal**
**Alon at Graham & Parks**

Khyati
Nurbek
Bowdie
Halina
James
Luisa
Beckett

**“Brave Stars Mini-Opera”**
**Composers and Librettists**

Graham & Parks School, Rm 215
Jeremiah Buie
Verity Gould
Eve Hanage
Moises Jean-Julien
Dayoung Lee
Danny Louis
Surina Phelan
Ellen Sun
Yifei Sun
Olivia Wolff

*Trio in Einstein-Rosen Bridge*

**Thanks to those providing artwork for the slideshow!**
- students of Lolly Lincoln at the Fletcher Maynard Academy
- members of the NCFO Festival Chorus
One Whole Step for Man: Order of Program

PIONEERS OF SPACE TRAVEL
Animal Astronauts* ..................Molly Ruggles, arranged by David Bass
Women in Space* .............................................................Lauren Mayer
Sally Ride* .................................................................Bruce Lazarus

THE SCIENCE OF SPACE TRAVEL
Weightless*.................................................................Tim Maurice
Science Fact, Science Fiction* ........................................Lauren Mayer
Space Time-Out* ....Ruth Hertzman-Miller, Lyrics by Meg Muckenhoupt
Thirty-Nine.........................Brian May, arranged by David Bass
Re-Entry* ......Andrea Gaudette, Lyrics by Andrea and Richard S. Gaudette
Dawntreader to Shangri-La* ............................................David Haines

CAMBRIDGE PUBLIC SCHOOLS SONGS
Trees* (4/20 only) ..................................Graham & Parks, Gr 1, Rm 110
(written with Andrea Gaudette)
MEDLEY: (written with David Haines)
Mythological Planetary Family Tree* ..Graham & Parks, Gr 1, Rm 107
Unsung Hero ..................................................Baldwin, Gr 2, Rm 202
Guinea Pig on the Moon* .................. Graham & Parks, Gr 2, Rm 111
Ruff Ruff Universe* ..................................MLK School, Gr 4, Rm 123
A Little Push Goes a Long Way*...............Baldwin, Gr 1, Rm 208

DESTINATION EARTH ORBIT
Earthrise*................................Daniel Kallman, Lyrics by Christine Kallman
ISS - Yes!* ..........................................................David Haines

DESTINATION MOON
Cool Moon ........................................David Haines, from Powers of Ten
Moondust Footprint* .................... Bruce Lazarus, Lyrics by Bobbi Katz

DESTINATION MARS
Little Rover that Could*........Molly Ruggles, with Valerie Ambroise King
Additonal Lyrics by David Bass

DESTINATION OUTER PLANETS
I'm Your Moon.........................Jonathan Coulton, arranged by David Bass
Brave Stars Mini-Opera* (4/20 only).................Andrea Gaudette,
Lydia Jane Graeff, and students

POINTS BEYOND
Droids in Space* ......................................................David Bass
Between Points A and B .............................................Bruce Lazarus
Exoplanet Explorer ..........David Haines, solo sung by Sarah Eastman
Einstein-Rosen Bridge Strut* ...Daniel Kallman, Lyrics by Christine Kallman

*World Premiere
One Whole Step for Man: Program Notes

Animal Astronauts – Since the late 1940s, we have launched all kinds of creatures past the Kármán Line (100 km above Earth’s surface, the altitude where space begins), paving the way for human space exploration.

Women in Space – Although today we think nothing of female astronauts, it’s worth remembering that it was once a revolutionary idea, and frustrations remain. Just last month, the first all-female spacewalk had to be reassigned because the International Space Station didn’t have two spacesuits that fit the women.

Sally Ride - Sally Ride was not only the first female American astronaut, she is still the youngest American ever to have traveled to space (at age 32) and the first known LGBTQ astronaut.

Weightless – Astronauts in orbit aren’t really weightless, it just seems that way because they are actually in a prolonged, sustained fall back to Earth.

Science Fact & Science Fiction – The technology depicted in the 1960s in Star Trek is in some cases prescient and in others ridiculous, but we sometimes can’t be completely sure which.

Space Time-Out – If a spacecraft were to make a round-trip voyage at very nearly the speed of light, significantly less time will have elapsed on the ship than back home on Earth. Space Time-Out includes quotations by Albert Einstein and Brian Greene and a musical quotation by Mozart.

Thirty-Nine – Interstellar travel by humans will be practical only at near-light speed or with the astronauts in prolonged suspended animation. Either way, the travelers would return younger than the loved ones they left behind.

Re-Entry – Spacecraft returning from the moon encounter the Earth’s atmosphere at nearly 25,000 miles per hour. Air friction increases the heat shield temperature to about 5000ºF. Without a light, strong heat shield that could dissipate heat by several mechanisms, Apollo missions wouldn’t have been possible.

Dawntreader to Shangri-La – Chemical rockets are not the only method for propelling spacecraft into and through space. We can also tap into energy from Earth’s rotation, orbital motion of other planets, electrostatic repulsion of ions, and the solar wind, among other sources.

Trees – Like David Haines, Andrea Gaudette works with young children, guiding them as they write songs about some aspect of their science curriculum. At our April 20 performance, Inbal Alon’s class from the Graham & Parks School will sing this song that they wrote.

Cambridge Public School Medley – Every year David Haines works with about 50 classrooms in the Cambridge schools, guiding the students as
they write a song about some aspect of their science curriculum. These are some songs that touch on space travel:

- **Planetary Family Tree** – The planets of the solar system are named for characters in Greek and Roman mythology.

- **Unsung Hero** – Without Michael Collins staying in the Lunar Orbiter, Neil Armstrong and Buzz Aldrin never could have been the first to walk on the moon.

- **Guinea Pig on the Moon** – Newton’s Law of Universal Gravitation predicts guinea pigs will weigh different amounts on different planets, proportional to the mass of the planet divided by its radius squared. For the moon that works out to about 1/6 Earth’s gravity.

- **Ruff Ruff Universe** – Sirius, the Dog Star, is a binary star in Canis Major and is the brightest star in the night sky. It is one of the closest stars to Earth, but still 50.6 trillion miles away (pay no attention to those other digits, they’re not significant).

- **A Little Push Goes a Long Way** – If you think you know what gravity is, Einstein’s Theory of General Relativity will quickly disabuse you of that notion.

**Earthrise** - Observations of our home planet made by astronauts orbiting Earth. The text for this song draws from comments made by astronauts who have experienced the view of Earth from outer space, including: Ron Garan (NASA), Jean-Francois Clervoy (France), Yuri Gagarin (Russian, First Human in Space), Karen Nyberg (NASA), Sandra Magnus (NASA), James Irwin (NASA, Apollo 15), Mike Massimino (NASA).

**ISS - Yes!** – The first modules of the International Space Station were put in low Earth orbit in 1998, and this orbiting observatory/laboratory/low gravity factory has been continuously occupied for more than 20 years. A joint venture between the American, Russian, Canadian, European and Japanese space agencies, ISS is also envisioned to provide transportation and maintenance, and to act as a staging base for possible future missions to the Moon, Mars and asteroids over the next decade.

**Cool Moon** – A haunting account of the Moon’s cold lifelessness. Surprisingly, there is water beneath the lunar surface and in shadows, potentially a valuable resource for future human settlements there.

**Moondust Footprint** – Most of us who were around in 1969 can remember exactly where we were and how we felt when Apollo 11 brought the first humans to the surface of the Moon.

**Little Rover That Could** – There have been about 50 missions to Mars since 1960, and most failed. But Pathfinder in 1997, which included Sojourner, the first Martian rover, exceeded all expectations and at much lower cost than previous missions.
I’m Your Moon – In 2006, after the International Astronomical Union downgraded Pluto to a “dwarf planet”, Mr. Coulton wrote “I’m Your Moon”, a song of consolation sung by Charon to her sister Kuiper Belt object.

Brave Stars Mini-Opera - The libretto, music, and piano sound effects for this mini-opera were created in a workshop for 2nd-4th graders held at the King Community School in Cambridge, directed by Andrea Gaudette and Lydia Jane Graeff, co-sponsored by Boston Lyric Opera. The finale aria was composed in a workshop with Debbie Sullivan’s 3rd Grade music students at Graham & Parks School. NCFO chorus members Verity Gould and Ellen and Yifei Sun finished the music. Andrea then added orchestration to complete the piece. The opera’s story was inspired by a fascinating field trip to the Harvard-Smithsonian Center for Astrophysics. The full opera will be performed on April 20.

Droids in Space – Sending humans into space is exciting and romantic, but costly and dangerous. Miniaturization, automation and robotics have advanced to the point that there is little people can do in space that can’t be done better and more cheaply by machines.

Between Points A and B – It’s hard to comprehend how big space is and how profound an impediment to space travel its size is.

Exoplanet Explorer – David Haines says his meeting with MIT Astrophysicist Sara Seager in her 14th floor office overlooking the Charles River was an inspiring glimpse into a modern-day explorer’s mind. “She’s evidently a rigorous scientist who moves freely and easily in a mathematical world I can only vaguely appreciate, but she’s driven by a passion to explore our cosmos and is riding a wave of tangible excitement towards the near-certain discovery of an Earth-like planet – perhaps even bearing life – within the next few years.”

Einstein-Rosen Bridge Strut – Faster-than-light travel is impossible, but in 1935, Albert Einstein and his colleague Nathan Rosen used the Theory of General Relativity to propose the existence of “bridges” through space-time. These bridges connect two different points in space-time, theoretically creating a shortcut that could reduce travel time and distance. Such “wormholes” remain theoretical and have never been observed, but they’re fun to dream about.

Sign up on the NCFO Mailing List to be notified about next year’s auditions and both opera and festival chorus performances! 

http://familyopera.org/mailinglist.html
Like Jonathan Coulton (see below), **David Bass** sang close harmony at Yale while preparing for a career in engineering, quit his day job to write music, has attracted a loyal following, and has a beard. There the resemblance ends. A composer of pretentious music as a teenager, David wrote the distinctly unpretentious *Space Opera* in 1997 for the enjoyment of his three young children, their friends, and their families. He founded NCFO in 1999 to perform *Space Opera* and has since written three more, including *The Coronation of Esther*, *Kids Court* and *Springtime for Haman*. David continues to write music whenever he can avoid taking himself too seriously.

**Jonathan Coulton** attended Yale University, where he sang close harmony and prepared for a life of writing software. He quit his day job in 2003 and has attracted a vast, loyal following of fellow social misfits with his quirky, geeky humor and considerable skill as a songwriter and performer. His major works include such anthems as “Code Monkey”, “Re: Your Brains”, and “Skullcrusher Mountain”.

**Sarah Eastman** is a Boston-based Soprano and voice teacher dedicated to sharing the gift of music with others. In addition to directing NCFO’s Science Festival Chorus this year, she was a vocal coach for *Space Opera*. She holds a Bachelor of Music in Voice Performance with a minor in Italian from Towson University and a Masters of Music in Vocal Pedagogy from the Boston Conservatory. Currently, she works with Boston City Singers, serving as the Jamaica Plain Training Chorus Director and directing the pilot Boston City Singers Carolers. She is also the Voice Department Coordinator and on voice faculty at All Newton Music School.

**Andrea Gaudette** has been playing music professionally since age 14, when her first job carried the title “substitute organist” for her parish church. She holds a bachelor’s degree from New England Conservatory and a master’s in music education from The Boston Conservatory. Andrea has been teaching piano, theory, composition, voice, choir, instrumental ensembles and creative arts to children in a variety of settings since 1988. Andrea lives in Cambridge with her husband and 21-year-old daughter. They have been active in NCFO since 2006.

**Richard Gaudette** worked on the Apollo project in the 60’s with the aerothermochemistry group in the Boeing space division, investigating the return module heat shield integrity upon reentry in earth’s atmosphere. He subsequently worked locally at Polaroid as a principal chemical engineer. At 17, he began his second profession as a keyboardist (piano, organ, and harpsichord) at many churches, currently substituting in Marin County, California.

Trained at Bristol University, London’s Guildhall School, and Banff School of Fine Arts, **David Haines** has written fifteen music theater works, including *The Puzzle Jigs*, which was performed by NCFO in 2003 and 2008. He has worked with many thousands of schoolchildren and has a special interest in using song to enhance the science curriculum. The NCFO Science Festival Chorus performed David’s science oratorios *Lifetime: Songs of Life and Evolution* in 2007 and 2012 and *Powers of Ten* in 2008 and 2014. (Continued on next page.)
One Whole Step for Man: Biographies

David Haines, continued: The latter was the official opening event of the first USA Science and Engineering Festival in Washington DC. David has been the Cambridge Science Festival’s Songwriter-in-Residence from 2011 to 2017. He lives and teaches in the beautiful town of Teignmouth, Devon in southwestern England. If you visit, David invites you to stay at his lovely Airbnb.

Ruth Hertzman-Miller is a Boston-area physician and musician who has written several songs for the NCFO Science Festival Chorus. She performs regularly with NCFO and was last seen as an a cappella singing droid in the 2019 production of Space Opera. She currently studies composition in the Professional Studies certificate program at New England Conservatory.

Christine Kallman is a playwright, lyricist, poet and musician. Her work has been supported and produced by arts organizations, theaters, schools, colleges and churches. She has taught music and theater to young people in the classroom, theater camp, and private studio. Among her works are full-length plays, one-acts, and musicals, including Donata’s Gift, a holiday musical based on the Italian legend of Old Befana. Her most recent play, A Falling Out, is set at the time of the Cuban Missile Crisis and was presented last spring in a staged reading supported by the Southeastern Minnesota Arts Council through a McKnight Artists Grant. In addition to writing song lyrics, Kallman has received several commissions to write hymn texts.

Daniel Kallman’s compositions for orchestra, winds, and choir are widely published and performed across North America, Europe and East Asia. His steady stream of commissions includes music for worship, theater, dance, and the young musician. Kallman has composed for the National Symphony Orchestra, the Air Force Academy Band, the Hong Kong Children’s Choir, the Minnesota Orchestra, A Prairie Home Companion, and a wide variety of vocal and instrumental ensembles. The principal publishers of Kallman’s music are Morning Star Music (church choir), Hal Leonard (choral), Shawnee/Mark Foster Press (children’s choir), Boosey and Hawkes (winds and choral), and Lauren Keiser Music (orchestral). All of Kallman’s works are catalogued on his website, kallmancreates.com.

Author and lyricist Bobbi Katz once told Contemporary Authors: “I write for children because I hope to join those writers and artists who delight, sensitize, and give hope to children.” A former editor at Random House, Katz has had success publishing her own rhyming picture books for elementary school students. These range from the sublime, such as American History Poems and We, the People, to the outright ridiculous, such as A Rumpus of Rhymes: A Book of Noisy Poems. Whatever the tone, Katz uses rhyme to catch children’s attention in order to teach and entertain them. American History Poems and We, the People introduce young students to important figures in American history as well as fictitious representative citizens from previous centuries.

Composer Bruce Lazarus’s music includes pieces for piano, solo voice, chorus, chamber ensembles, as well as several songs commissioned by NCFO. His works range from the 45-minute “celestial” piano cycle, Musical Explorations of the Messier Catalogue of Star Clusters and Nebulae, to his entertaining Carrolling: The Lewis Carroll Project. (Continued on next page.)
Meg Muckenhoupt works for OpenBiome in Cambridge. She is widely published, but she feels her finest work was “Horton Sees a Pluto,” which appeared in the *Annals of Improbable Research*. Remember, a planet’s a planet no matter how small. She is delighted to hear her lyrics debut in this year’s Cambridge Science Festival.

Molly Ruggles is a native of Massachusetts, has played piano her whole life, composed since she was 4, and is a vocalist and recording artist. Molly performs regularly throughout the Boston area. She has taught songwriting classes at MIT, and her music is featured regularly at the UU church of Medford. When not singing, playing, listening, teaching, composing, or writing plays, she writes about educational technology at MIT and spends time with her beloved daughter.

Lauren Mayer is a California-based, award-winning writer and entertainer, who has performed hundreds of custom-written programs. She is a summa cum laude graduate of Yale University, the founder of Curriculum Rocks (producing award-winning children’s educational music), the writer of several published musicals, and a five-time recipient of the San Francisco Cabaret Gold Award. She has recorded five albums of comedy songs and writes weekly topical comedy songs for her YouTube channel with almost 2,200 subscribers (thus disproving her teenage son’s claim that she’d never get a channel going because “over 100 views is viral for old people”).

Brian May studied physics and mathematics at Imperial College, London, but suspended his PhD studies in 1974 to pursue musical interests as a composer, singer and guitarist. He resumed his studies after a 32-year hiatus and received his doctorate in astrophysics in 2007. May was then named Chancellor of Liverpool John Moores University, a post he held until 2013. He has published numerous books and articles and collaborates with NASA on the New Horizons project. He is an active animal welfare advocate and vice president of the RSPCA. Musically he is best known as the co-founder and lead guitarist of the rock band Queen.

Tim Maurice is a classically trained musician working as an arranger, music director, and pianist. He has written and recorded music for several independent film projects, ranging from short films to web series. His latest, “Searchdog,” screened at the 2016 Palm Springs International Film Festival and was an audience-voted “Best in the Fest” selection. Born in Maine, Tim attended Bates College, where he studied piano, and Berklee College of Music, where he earned a B.M. in Film Scoring. Tim has done extensive orchestration and arranging work for NCFO in the past, and this is his fourth original composition for the group.

Bruce Lazarus, continued: He studied composition at Juilliard, where he earned his B.M. and M.M. in music composition and theory, and later earned his PhD in music theory at Rutgers University. Dr. Lazarus is Music Director for the Joffrey Ballet School.
THANK YOU
NCFO gratefully acknowledges the following people and organizations for their support of the NCFO Science Festival Chorus

This is the thirteenth consecutive year that NCFO’s Festival Chorus has participated in the Cambridge Science Festival, since the Festival’s inception in 2007. As always, we would like to thank John Durant for dreaming up this wonderful annual Cantabrigian event. Thanks also to Rory Keohane for his assistance with our logistics. We are also grateful to the Broad Institute of MIT and Harvard, and to the Cambridge Main Public Library for generously hosting our concerts.

We would not have a program without the musicians and artists who provide us with our material, so thanks to our composers, arrangers, and artists. Your creations about the history, the science, and the future of space travel have made this concert fun to perform, entertaining, and enlightening.

Thanks in particular to David Haines, who is back this year to provide accompaniment for our concerts and to continue his inspirational work, leading songwriting workshops with students in the Cambridge Public School system. We are particularly grateful to the Cambridge Community Foundation for supporting David’s CPS work, which allows us to sing a medley of these student-created songs in our annual concerts.

We are very grateful to Thalia Tringo Real Estate for their continued sponsorship of NCFO and to the Robbins-de Beaumont Foundation for their generous grant this year. A special thank you to the Cambridge Arts Council and the Massachusetts Cultural Council whose grant was in direct support of our “One Whole Step for Man” Science Festival concerts.

Finally, we are grateful to all of our chorus members. Thanks as always for sharing with us your music, your friendship, and your financial support.

NCFO MISSION
The North Cambridge Family Opera (NCFO) provides an opportunity for children and adults to experience and enjoy telling a story through song by performing original, high-quality, fully-sung operas and choral works for audiences of all ages. Our casts of children and adults come from Cambridge and other communities in the greater Boston area. We encourage participation by multiple family members. Solo and chorus roles varying widely in difficulty are assigned to both children and adults, so that everyone is both challenged and given an opportunity to succeed. To the extent possible, productions are financed through donations and volunteerism.

NCFO began as participants in the second North Cambridge (NoCa) All Arts Open Studios weekend in May 1999, and has since incorporated as a 501(c)(3) non-profit and produced a family opera every spring. Since 2007, NCFO has also presented a concert of science songs every year as part of the Cambridge Science Festival.