

ABRAMORAMA and BOND360
Presents

PARTICLE FEVER



A documentary film by **Mark Levinson** and **David Kaplan**

In theaters beginning March 5, 2014

Runtime: 99 minutes

www.particlefever.com/

Press Materials Available At:

<https://www.dropbox.com/sh/i0eih330kkzhx1/gEyeME8Cgy>

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LOGLINE:

Particle Fever follows the inside story of six brilliant scientists seeking to unravel the mysteries of the universe, documenting the successes and setbacks in the planet's most significant and inspiring scientific breakthrough.

SHORT SYNOPSIS:

Imagine being able to watch as Edison turned on the first light bulb, or as Franklin received his first jolt of electricity.

For the first time, a film gives audiences a front row seat to a significant and inspiring scientific breakthrough as it happens. *Particle Fever* follows six brilliant scientists during the launch of the Large Hadron Collider, marking the start-up of the biggest and most expensive experiment in the history of the planet, pushing the edge of human innovation.

As they seek to unravel the mysteries of the universe, 10,000 scientists from over 100 countries joined forces in pursuit of a single goal: to recreate conditions that existed just moments after the Big Bang and find the Higgs boson, potentially explaining the origin of all matter. But our heroes confront an even bigger challenge: have we reached our limit in understanding why we exist?

Directed by Mark Levinson, a physicist turned filmmaker, from the inspiration and initiative of producer David Kaplan and masterfully edited by Walter Murch (*Apocalypse Now*, *The English Patient*, *The Godfather* trilogy), *Particle Fever* is a celebration of discovery, revealing the very human stories behind this epic machine.

LONG SYNOPSIS:

July 4, 2012: The world watched as the outcome of the biggest and most expensive experiment in the history of physics was revealed. Meanwhile behind the scenes, an entire generation of physicists faced the defining moment of their careers; an announcement about the elusive Higgs boson that would change the way we understood our universe.

Particle Fever follows the inside story of six brilliant scientists seeking to learn the truth about an essential mystery of the universe, documenting the successes and setbacks in the planet's most significant and inspiring scientific breakthrough.

For distinguished physicists like Fabiola Gianotti and Savas Dimopoulos, the construction of the Large Hadron Collider (LHC) and results of the collision will be the culmination of a lifetime's work. Meanwhile, for physicists like Monica Dunford and

Martin Aleksa, the experiment is more than an opportunity to truly establish them in an elite world of physics; it's a chance to be a part of history.

The film also follows Nima Arkani-Hamed, an intense, outspoken young theorist whose ideas will be tested at the LHC, leaving him with much to prove. And, in the face of mechanical functions and failures, Beam Operation Leader Mike Lamont feels tremendous pressure to make sure the launch of the LHC goes as planned.

As they seek the keys to unlocking the very building blocks of physics, our protagonists join more than 10,000 scientists from over 100 countries in pursuit of a single goal: to recreate conditions that existed just moments after the Big Bang and find the Higgs boson, potentially explaining the origin of all matter. But our heroes confront an even bigger question: do the clues to the origins of the universe even exist?

Four years prior to the outcome of the LHC experiment, Mark Levinson, a physicist turned filmmaker, joined forces with Johns Hopkins University professor of particle physics David Kaplan, who saw the dramatic potential behind the world's largest experiment. The filmmaking team gained unprecedented access at CERN in Geneva, Switzerland, in order to narrate the very human story taking place underlying a massive venture. Editor Walter Murch (*Apocalypse Now*, *The English Patient*, *The Godfather trilogy*) masterfully edited *Particle Fever* with an incredible knowledge of filmmaking and a keen understanding of physics, producing a film that is as dramatic and informative as it is visually stunning

Together the filmmakers, along with the six subjects take you through the theories behind the science and the consequences for humanity.

Q&A WITH DIRECTOR MARK LEVINSON:

How did this film initially come about?

David Kaplan had the idea, I think maybe as early as 2006, to somehow record the start-up of the Large Hadron Collider as it was going to be a nearly unprecedented moment in the history of science. This machine, when turned on, was going to be able to give answers to some of the deepest questions we had about how the universe works. People had been waiting 50 years to see if certain basic ideas were true, and suddenly they would know whether they were on the right track, or if maybe it was all a waste and they needed to go back to square one. So, David saw the dramatic potential of the story and as an active physicist himself, he was able to see and feel the anticipation and anxiety in the people he knew.

I met David in the fall of 2007. I had been in the narrative feature world and was actually invited to pitch a script I had written to a group of Angel Film Investors. The organizer of the event told me that some physicist had applied to make a documentary, but he had no film experience and wanted to make a film about an experiment that nobody knew would even work, so they didn't choose it to be presented. I, of course, thought it sounded like a potentially GREAT film, about a field I knew and with real dramatic narrative potential for a film. So I got David's contact information and tracked him down. I think we quickly realized we were on the same page about making a very dramatic, character-based, real and true film about this unique moment in history - unlike any other "science" film.

You received a doctorate in theoretical particle physics. How did the transition into filmmaking happen?

The transition actually seemed remarkably straightforward to me. What entranced me about physics was the profound beauty and elegance of the theories, and the magic and mystery in the fact that abstract symbols encoded deep truths about the universe. I made the transition to film when I recognized an alternate avenue for exploring the world around us, in the human dimension, that also seemed mysterious and magical. For many years, I harbored the hope that I could find some project that could weave together the two seemingly disparate strands of my life. The start-up of the Large Hadron Collider provided the perfect combination of both a profound scientific and human endeavor. One of the characters in *Particle Fever* speculates, "Why do we do science? Why do we do art? It is the things that are not directly necessary for survival that make us human."

How many years did it take to do this film and what were the challenges?

David and I met at the end of 2007 and really started working on the film, essentially full-time, at the beginning of 2008. The big announcement of the discovery of the Higgs boson on July 4, 2012 became a great end for the film. It took another year to put it all together into the finished film.

There were many challenges in filming. First, there were 10,000 people involved in the experiment. We always knew we wanted it to be character-based, but who do we choose? People were also scattered all over the globe. How, on a rather limited budget, do we cover people all around the world?

Also, particular to this story, a story about real scientific discovery, we constantly had to decide when and where something significant might occur. And how long do we continue filming? What if there was no definitive discovery?

One of the things that was not a particular challenge to me, luckily, because of my physics background, was understanding what was going on.

In terms of actually putting the film together, the biggest challenge certainly was making the film accessible to a non-specialist audience, while at the same time remaining authentic.

How did you address the challenge of capturing the visual elements of the Large Hadron Collider?

We always wanted the film to be visually striking. We shot HD and used very experienced cinematographers who specialized in documentaries. Claudia Raschke-Robinson was our principal DP, and Claudia has a great visual sense. She's also done a lot of still photography. You often don't have control of a situation when things are happening in real time, and certainly don't have a chance to move something like the ATLAS experiment, as big as a 7 story building, to suit your visual needs, but we always tried to be aware of visual themes – scale, symmetry, beauty.

Who or what influenced your film?

I'd say the big influence for me was really more narrative dramatic films. This is my first documentary. I worked on many narrative films, directed one low-budget feature myself, and so I was always thinking story in the back of my mind.

What do you think is the drive behind man's innate urge to understand the world around you?

As Savas says at the end of the film, the pursuit of these things, not really necessary for survival, are what make us human. There is a continuous line, beginning with the first symbolic representation of our "environment" with the cave paintings at Chauvet, to the sophisticated equations of physics that we think describe the deepest, inner workings of the universe. Fabiola quotes Dante as well about this: there is something fundamental about this that distinguishes us from animals. Man has always tried to make sense of the world around him and to understand his place in a vast universe.

What was the most surprising thing you learned?

It takes a long time to make a documentary!

What do you hope people take away from the film?

I hope they have a certain appreciation for the wonderful, monumental achievement that is embodied in particle physics. It really is truly amazing that we've been able to come up with these incredibly complicated theories about things we can never actually physically see with our eyes, in a sense an entirely invisible world, but it has rules and laws and we can make predictions about things that we CAN see, and we build this huge machine, and then some theoretical ideas scribbled down on paper result in some electronic blip in this gigantic machine – and it's just what we predicted! This is the cutting edge of our understanding of how the universe works.

I also hope they really see how human the people are that do this.

What does the film say about the world we live in?

That the universe, in its extraordinary complexity, can be understood in terms of some basic principles, by a handful of mathematical equations, that we, with our tiny brains, can comprehend. At least at some level.

Can protons and antiprotons annihilate into photons?

Yes. But Angels and Demons was total fiction.

ABOUT THE FILMMAKERS:

Mark Levinson (Director)

Before embarking on his film career, Mark earned a doctoral degree in particle physics from the University of California at Berkeley. In the film world, he became a specialist in the post-production writing and recording of dialogue known as ADR. He has worked closely with such directors as Anthony Minghella, Francis Coppola, Tom Tykwer, Milos Forman and David Fincher. He is the writer/producer/director of the narrative feature film *Prisoner of Time*, which examined the lives of former Russian dissident artists after the collapse of the Soviet Union, and had an acclaimed premiere at the Moscow International Film Festival.

David Kaplan (Producer)

David Kaplan is a professor of theoretical particle physics at Johns Hopkins University and studies supersymmetry, dark matter, and properties of the Higgs boson. After receiving his Ph.D. from the University of Washington in Seattle, David held research positions at the University of Chicago and Stanford's Linear Accelerator Center. He has been awarded the Outstanding Junior Investigator prize from the Department of Energy and named an Alfred P. Sloan fellow. He has been a featured host and consultant on science programs for the History Channel and National Geographic.

Claudia Raschke-Robinson (Cinematographer)

Award winning cinematographer Claudia Raschke-Robinson has photographed independent feature films and documentaries for over 15 years. Her most notable feature documentaries are Mad Hot Ballroom (Best Documentary, Karlovy Vary Film Festival 2005), Peabody Award winning Black Magic (2009, ESPN), The Music In Me (HBO series 2008), Oscar-nominated My Architect (add'l DP), Oscar-nominated Small Wonder (add'l DP), and Oscar nominated Sister Rose's Passion (add'l DP).

Walter Murch (Editor)

Universally acknowledged as a master in his field, he is revered for his work as a film editor and sound designer, a term that he coined. Murch has worked with, among others, director Francis Ford Coppola on such cinematic milestones as The Godfather I, II and III, and Apocalypse Now, for which he won his first Academy Award in 1979. He also worked on Anthony Minghella's film The English Patient for which he won an unprecedented double Academy Award in 1996 for both film editing and sound engineering. He has also been nominated for Oscars for The Conversation, Julia, The Godfather: Part III, Ghost, and Cold Mountain. Murch has written a beautiful book on film editing, In the Blink of an Eye (2001).

Andrea Miller and Carla Solomon / Anthos Media (Producer)

Anthos Media LLC is a new company dedicated to the production and distribution of documentary films aimed at the family audience. Along with Particle Fever, the company has produced The New Public by Jyllian Gunther, a feature length documentary invited to screen at the White House in the spring of 2014, and two shorts – one about the oldest psychoanalytic institute in the United States and the other about first responders to the Haiti earthquake of 2009. The company is currently working on The Zionist Idea, a three part series for PBS, Letters from Baghdad, a feature length doc about the English diplomat Gertrude Bell, and Joseph Pulitzer: Voice of the People, about the man behind the prize.

Anthos principal Andrea Miller is an independent producer with more than twenty-five years of experience in the entertainment business. Her credits include the feature Dark Matter, with Meryl Streep, Aiden Quinn and Chinese actor Liu Yeh (Sloan Prize, Sundance; best narrative feature, Asian Film Festival), “Pee Wee’s Playhouse” (Emmy), “Shining Time Station,” and the original “Indecision ‘92” (Comedy Central’s longstanding election coverage). She was formerly Vice President of International Co-Production and Sales at Sony Wonder and Vice President of Programming at Turner Networks Asia, responsible for channel launches of TNT and Cartoon Network throughout the region and General Manager of Cartoon Network Japan. She serves on the board of the Flea Theater and among numerous projects as a consultant; she is currently working on the first free-to-air children’s television channel in Kenya as well as an opera by famed author Colm Toibin and composer Alberto Caruso.

Anthos principal Carla Solomon is a clinical psychologist and psychoanalyst by training, and remains an active member of the New York Psychoanalytic Society & Institute (NYPSI). In 1991 she founded KiDS of NYU Langone, an organization of parents, physicians and friends who support children’s services at NYU Langone Medical Center through philanthropy, community service and advocacy. She currently serves on the board of trustees of NYU Langone Medical Center, and remains an active member of KiDS of NYU Langone and the NYU Child Study Center. As a board member of the School for Strings and parent liaison at New York Youth Symphony Orchestra, she is an advocate for broad-based music education for young people. Past president of the New York Psychoanalytic Foundation, she is currently a member of the executive committee of NYPSI’s Helix Center, which draws together leaders in the arts and sciences for interdisciplinary conversation.

Robert Miller (Composer)

Composer Robert Miller has written several works that have been performed by orchestras nationwide. He has been the Composer-In-Residence with the New York-based Jupiter Symphony from 1996 - 1999. The New York Pops performed his orchestrations to Leonard Bernstein’s famed West Side Story Variations at Carnegie Hall. In addition to his symphonic efforts, Miller is considered among the top echelon of composers working in television and commercials. Some of his recent films include a

feature documentary, *Why We Fight* (Grand Jury Prize at Sundance 2005), *Red Doors* (Best NY Narrative, Tribeca 2005), and the critically acclaimed *The Caller* (2008).

MK12 (Graphics and Animation)

MK12 is a design and filmmaking collective with acclaim in both commercial and artistic arenas. Founded in 2000, MK12's work constantly challenges the boundaries between narrative structure and experimental storytelling via juxtapositions of live action, graphic design, nostalgic influence and new technologies. MK12 has been sought after to direct numerous commercial & network-based projects and has been involved with several game promotions & cinematics, and has also created title sequences & in-film graphic FX for feature films such as *Stranger than Fiction*, *The Kite Runner*, *Holy Wars* and *Quantum of Solace*. Their self-produced short films have been featured in numerous international film festivals.

ABOUT THE PHYSICISTS:

Savas Dimopoulos

A Greek immigrant who now occupies an endowed chair at Stanford University, Savas has been on an odyssey for 30 years to find the true theory of nature. Many consider him the most likely to have a theory confirmed by the LHC, potentially winning the Nobel Prize. A mentor to many in the field, Savas has recently begun to feel the pangs of age, and worries if he'll be an active participant in the next revolution.

Nima Arkani-Hamed

An intense, outspoken young theorist, Nima's father was also a physicist, who spoke openly against the Iranian Revolutionary Guard after the revolution in 1979. In fear for their lives, the family fled into Turkey on horseback. Nima now treats physics with the same life and death imperative. Snatched up by Harvard with a full professorship before he was 30, Nima moved in 2008 to the Institute for Advanced Study in Princeton. With many of his ideas poised to be tested at the LHC, Nima hopes to make the impact his colleagues think he is capable of. He bet several years salary that the elusive Higgs boson would finally reveal itself at the LHC.

Fabiola Gianotti

In 1982, Fabiola received a piano diploma at the Conservatorio Giuseppe Verdi in Milan, Italy. In 1989, she received her Ph.D. in Particle Physics from the University of Milan. She has devoted the last 20 years to the development of the ATLAS detector, the largest detector at the LHC. She became the leader of the experiment just as the LHC began operation, supervising nearly 3,000 physicists and engineers around the world. Like her Italian ancestor, Columbus, Fabiola's fervent dream for the LHC is to discover an entirely unexpected "new world."

Monica Dunford

Awarded a prestigious Enrico Fermi Fellowship from the University of Chicago, Monica's gung ho, adventurous spirit has led her not only to the frontiers of science, but to the boundaries of human endurance. Her "leisure" activities of marathoning, cycling, rowing and mountain climbing have provided useful conditioning for the 16-hour days she regularly spends working on the ATLAS detector. As a young American post-doc, she is excited to be at the center of the physics universe and anxious to make her mark during her stint in Geneva.

Martin Aleksa

Arriving from Austria over 12 years ago, Martin now has a coveted permanent position at CERN. He was one of the original designers of one of the central components of the ATLAS detector, the Liquid Argon Calorimeter. Elected to the position of ATLAS Run Control Coordinator in 2011, Martin was handed overall responsibility for the collection of data from the ATLAS detector just as the LHC began to produce its first new results.

Mike Lamont

Trained as a physicist in England, Mike migrated to the engineering side of the actual collider machine in Geneva. As Beam Operation Leader, he feels a personal responsibility to "deliver beams" of protons to the experiments. His dry wit has been a

welcome relief in the adrenalin-charged, high-pressure environment of the CERN Control Center.

PARTICLE FEVER CREDITS

Anthos Media, LLC in association with PF Productions, LLC
presents
A Mark A. Levinson and David E. Kaplan Film
PARTICLE FEVER

Executive Producers Thomas Campbell Jackson
 Gerry Ohrstrom

Producers Andrea Miller
 Carla Solomon

Cinematography Claudia Raschke-Robinson
 Wolfgang Held

Design and Animation MK12

Music Robert Miller

Editor Walter Murch

Producer David E. Kaplan

Director and Producer Mark A. Levinson

PARTICLE FEVER TAIL CREDITS:

Additional Editor Mona Davis

Sound Designer Tom Paul

Re-Recording Mixers Tom Paul
 Walter Murch

Associate Producer Wendy Sax

Line Producer Brian Cange

Production Managers Sonia Malfa
 Nan Sandle
 Martin de Buck

Geneva Production Services Rita Productions
 DH Film Service

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 Jacques Fichet
 David Blood
 David Leitner
 Daniel McKeown
 Pascal Montjovent

Sébastien Moret
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Matthew Ryan
Nancy Schreiber
Petr Stepanek
Melora Kaplan

Gaffer Joachim Chardonnens

Sound Recording David Puntener
Matt Janson
Nicolas Binggeli
Dan Gleich
Bernie Ozol
Masaki Hatsui
Benedikt Fruttiger
Jim Anderson
Jeremy Berger
Brian Copenhagen
Romeo dos Santos
Jeff Ent
Mark Fortgang
Lance Hoffman
James E. Jack
Ethan Johnson
Jorg Lempen

Production Coordinator Barbara Lindorme

PA's Greg Almond
Benjamin Banon
Shailendra Karki
Mark LePatner
Michael MacDonald
Leigh Mierke
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Additional Editing and Music Supervisor Tim Sternberg

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Sound FX Editors Sean Garnhart
Chris Davis
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ADR and Foley Engineer Perry Levy
Foley Eric Milano

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Post Production Services Final Frame
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DI Online Editors Owen Rucker and Drew Kilgore
DI Producer Caitlin Tartaro

Archival Research Danielle Varga

Science Outreach Consultant Alan Friedman

Thanks To Our Participating Physicists

Martin Aleksa
Nima Arkani-Hamed
Savas Dimopoulos
Monica Dunford
Fabiola Gianotti
Mike Lamont

Asmina Arvanitaki
Jon Bagger
Riccardo Barbieri
James Beacham
Christophe Clement
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Sotiris Vlachos
Neal Weiner
Thorsten Wengler
Jorg Wenninger
Bogdan Wojtsekhowski
Itay Yavin
Seth Zenz

Thanks To Our Special Friends at CERN:

Claudia Marcelloni
James Gillies
Markus Nordberg
Jacques Fichtel
Marion Viguier
Vianney Lebigot
Katie Yurkewicz
Paola Catapano
Chris Thomas
Ashley WennersHerron

Special Thanks For Their Generous Support

Stephen and Pamela Hurst Della Pietra
Vincent Della Pietra and Barbara Amonson
Debbie and John Evangelakos
Scott Helm and Lesley Malin
James and Robin Herrnstein
Ron Kahn
Davida Kaplan
Diane and Walter Looney
Antonio Magliocco, Jr.
Charles Merinoff
Ralph O'Connor
Matthew Polk
Martin Schmaltz and Susan Reid
Butch Schuman
Pierre Schwob
Wallace Wilson
David Yaffe

Alfred P. Sloan Foundation
Richard Lounsbery Foundation, Inc.
The Poses Family Foundation
Joe B. Foster Family Foundation
The Cynthia and George Mitchell Foundation
The Winston Foundation, Inc.
Arts Engine

Women Make Movies, Inc
Johns Hopkins University
National Science Foundation
KITP
The Physics Departments at New York University, Stanford University, and the Institute for Advanced Study

Still More Thanks
Sophie, Sebastian, Maxence, Camille Aleksa
Eleni and Christina Dimopoulos
Kate McAlpine
Roz Chast
Laura Schuman Craig
Silent Crow Arts / Matt Bennett
Sondra James
Keith Buterbaugh
Ross Klavan
Bill and Georgette Timoney
GrassRoots TV12
Aspen Center for Physics
Andy Aaron
Reed Anderson
Will Arntz
John Cook
David Dawkins
Marilys Ernst
Adam Falk
Christine Ferrara
Tony Gilroy
Greg King
Mike Lucibella
Tim Mann
Rod Nichols
Duncan Pettigrew
Barbara Poland
Vicki Marmorstein and Seth Ribner
Dick and Carole Rifkind
Carmen and Lee Ritenour
Shanghai Park Restaurant
Nick Russell
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Christine Waite
Sylvia Wehr
Neal White
Roger Winkelman
Anne Yao
Maria Machado at GSA Music
Taghi Amirani
Simone

Piano, Synthesizer, All Orchestrations	Robert Miller
Violin	Elena Barere
Frame Drums	Glen Velez
Music Recording and Mixing	Nick Tuttle
Music Production Coordination	Megan Campbell

“The Universe Abideth Forever” written by Abraham Kaplan
Vocals by Carolyn Miller

“Large Hadron Rap” courtesy of Kate McAlpine and Will Barras

“Cave of Forgotten Dreams” footage courtesy of Creative Differences and Skellig Productions Rock

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Washington, DC

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