

PF PRODUCTIONS  
Presents

# PARTICLE FEVER



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

**Runtime:** 99 minutes

[www.particlefever.com/](http://www.particlefever.com/)

Press Materials Available At:

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

**Press Contact:**

BOND Strategy and Influence / Brooke Medansky / [brookem@bondinfluence.com](mailto:brookem@bondinfluence.com)

**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, 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).

### **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 and two short documentaries – 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 *Letters from Baghdad* about the English diplomat Gertrude Bell and *Joseph Pulitzer: Voice of the People*, about the man behind the prize.

The company's principals are Dr. Carla Solomon and Andrea Miller. Dr. Solomon, a clinical psychologist and psychoanalyst, is a longstanding advocate for social change through volunteerism and philanthropy. Andrea Miller is an independent producer whose credits include the feature *Dark Matter* (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 an executive at Sony Wonder and also at Turner Networks where she headed the start-up of Cartoon Network Japan.

### **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.

## 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

Additional Editor Mona Davis

Sound Designer and Re-Recording Mixer Tom Paul

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

Additional Cinematography Neal Hartman

Jacques Fichet  
David Blood  
David Leitner  
Daniel McKeown  
Pascal Montjovent  
Sébastien Moret  
Peter Murtaugh  
Matthew Ryan  
Nancy Schreiber  
Petr Stepanek

Gaffer

Joachim Chardonens

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 (Princeton)  
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  
Sonia Rossier

Additional Editing and Music Supervisor Tim Sternberg

Dialogue Editor

Michael Feuser

Sound FX Editors

Sean Garnhart

Chris Davis

ADR and Foley Engineer

Perry Levy

Foley

Eric Milano

Edit Room Consultant	Stuart Dworeck
Editing Intern	Felix Trolldenier
Translation	Anna Salzman
Transcriptions	Georges Obied Grant Lease Kevin Mather Jessica Noviello Mandy Zhou Arielle Asher
Accountants	Kimberly Wolford Amy Hass
Bookkeeper	Jessi Schoenleber
Legal	Kaiser Wahab, Wahab and Medenica, LLC Paul Meyersohn, Surpin and Meyersohn, LLC
Post Sound Services	gigantic studios
Post Production Services	Final Frame
DI Colorist	Will Cox
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  
Riccardo Barbieri  
James Beacham  
Jed Biesiada  
Christophe Clement  
Andy Cohen

Katherine Copic  
Kyle Cranmer  
Georgi Dvali  
Lyn Evans  
Gian Giudice  
Sheldon Glashow  
Tobias Golling  
Benedetto Gorini  
Peter Graham  
David Gross  
Magali Gruwe  
Beate Heinemann  
Rolph-Dieter Heuer  
Joe Incandela  
Peter Jenni  
Shamit Kachru  
Verena Kain  
Juan Maldacena  
Peter Michelson  
Maurizio Pierini  
Mirko Pojer  
Surjeet Rahendran  
Lisa Randall  
Riccardo Rattazzi  
Albert de Roeck  
Philip Schuster  
Eva Silverstein  
Sara Strandberg  
Matteo Solfaroli  
Raman Sundrum  
Leonard Susskind  
Jesse Thaler  
Natalia Toro  
Tanmay Vachaspati  
Sotiris Vlachos  
Neal Weiner  
James Wells  
Thorsten Wengler  
Jorg Wenninger  
Bogdan Wojtsekhowski  
Itay Yavin  
Seth Zenz

Thanksto our special friends at CERN:

Claudia Marcelloni  
James Gilles  
Markus Nordberg  
Jacques Fichet

Marion Viguier  
Vianney Lebigot  
Katie Yurkewicz  
Paola Catapano  
Chris Thomas  
Steve Goldstein  
Ashley WennersHerron

Special Thanks for their generous support:

Stephen and Pamela Hurst Della Pietra

Vincent Della Pietra

Debbie and John Evangelakos

Scott Helm and Lesley Malin

James and Robin Herrnstein

Ron Kahn

Dauida 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

Richard Lounsbery Foundation, Inc.

The Poses Family Foundation

Joe B. Foster Family Foundation

The Cynthia and George Mitchell Foundation

The Winston Foundation, Inc.

Alfred P. Sloan Foundation

Arts Engine

Women Make Movies, Inc

Johns Hopkins University

National Science Foundation

The Physics Departments at New York University, Stanford University, and the Institute for  
Advanced Study

KITP

And More Thanks

Sophie, Sebastian, Maxence, Camille Aleksa

Eleni and Christina Dimopoulos

Katie McAlpine

Roz Chast

Silent Crow Arts / Matt Bennett

Sondra James

Keith Buterbaugh  
Ross Klavan  
Bill and Georgette Timoney  
GrassRoots TV12  
Reed Anderson  
Will Arntz  
Jon Bagger  
John Cook  
David Dawkins  
Marilys Ernst  
Adam Falk  
Christine Ferrara  
Tony Gilroy  
Greg King  
Tim Mann  
Rod Nichols  
Duncan Pettigrew  
Barbara Poland  
Vicki Marmorstein and Seth Ribner  
Dick and Carole Rifkind  
Carmen and Lee Ritenour  
Shanghai Park Restaurant  
Frank Summers  
Steven Tollen  
TCS  
Christine Waite  
Sylvia Wehr  
Neal White  
Roger Winkelman  
Anne Yao  
Simone

Copyright acknowledgements:

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

First Beam footage Courtesy of CNN

Higgs Discovery footage courtesy of AP Archive

CBSNews.com footage courtesy of T3 Media Licensing

Hagia Sophia image courtesy of Dumbarton Oaks, Image Collections and Fieldwork Archives, Washington, DC