



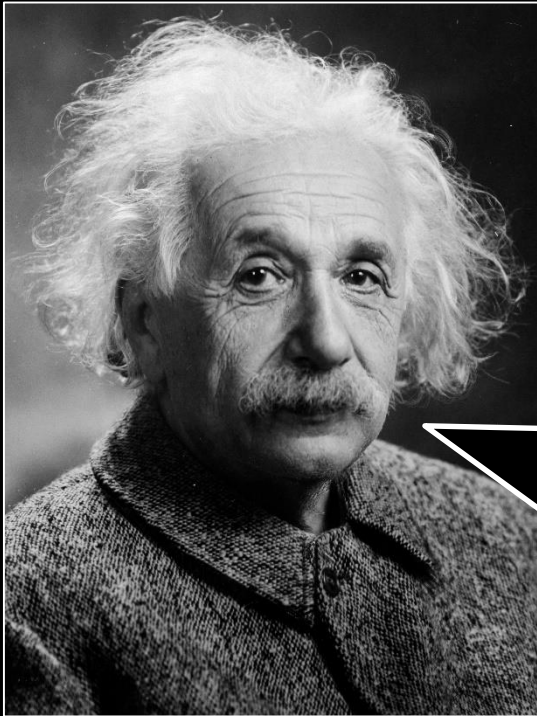
Movies vs Astronomy

Science fact or science fiction?

Dr. Jonathan Crass



Science Fantasy



Under no circumstances
can you travel faster than
the speed of light.

ABSOLUTELY NONE!





Recent Science Fiction Movies



DON'T

LET

GO

SANDRA BULLOCK
GEORGE CLOONEY

FROM DIRECTOR ALFONSO CUARÓN

GRAVITY

WARNER BROS. PICTURES PRESENTS

AN ESPERANTO FILMO/JHEYDAY FILMS PRODUCTION AN ALFONSO CUARÓN FILM SANDRA BULLOCK, GEORGE CLOONEY
"GRAVITY" MUSIC BY STEVEN PRICE COSTUME DESIGNER JANY TEMME VISUAL EFFECTS SUPERVISOR TIM WEBBER EDITORS ALFONSO CUARÓN, MARK SANGER
PRODUCTION DESIGNER ANDY NICHOLSON DIRECTOR OF PHOTOGRAPHY EMMANUEL LUBEZKI, A.S.C., A.M.C. EXECUTIVE PRODUCERS CHRIS DE FARIA, NIKKI PENNY, STEPHEN JONES
WRITTEN BY ALFONSO CUARÓN & JONÁS CUARÓN PRODUCED BY ALFONSO CUARÓN, DAVID HEYMAN
DIRECTED BY ALFONSO CUARÓN

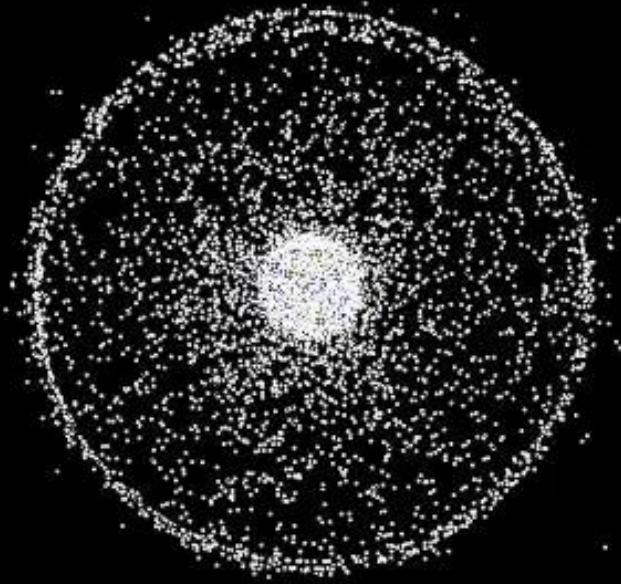
gravity-movie.net

MPAA RATED PG-13

SEE IT IN 2D AND 3D

WARNER BROS. PICTURES
A Time Warner Entertainment Company, L.P. Presentation
A Warner Bros. Entertainment Company

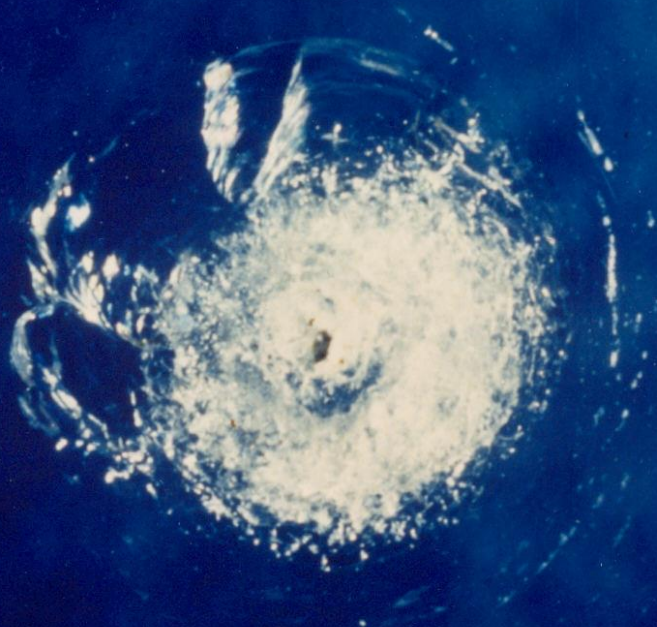
OCTOBER



“The greatest risk to
space missions comes
from non-trackable
debris”

Nicholas Johnson
NASA chief scientist for orbital debris

STS-7 Window Pit



1mm

41





The GOOD

- The repeated orbital debris impacts
- The speed of the oncoming debris
- The transition from the vacuum of space
 - Silence in space
 - Sound in a pressurised airlock


The BAD

- Satellite communications being disrupted
- The HST, ISS and Tiangong-I being close enough to travel between them
- Momentum
 - For every action there is an equal and opposite reaction





Other Opinions

 **Neil deGrasse Tyson** 
@neiltyson  


Mysteries of **#Gravity**: Why Bullock, a medical Doctor, is servicing the Hubble Space Telescope.

RETWEETS 1,488 LIKES 1,184 





11:50 PM - 6 Oct 2013

 **Neil deGrasse Tyson** 
@neiltyson  

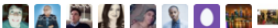
Mysteries of **#Gravity**: Why Bullock's hair, in otherwise convincing zero-G scenes, did not float freely on her head.

RETWEETS 1,056 LIKES 836 

12:15 AM - 7 Oct 2013

 **Neil deGrasse Tyson** 
@neiltyson  

Mysteries of **#Gravity**: How Hubble (350mi up) ISS (230mi up) & a Chinese Space Station are all in sight lines of one another.

RETWEETS 1,119 LIKES 827 

12:00 AM - 7 Oct 2013

 **Neil deGrasse Tyson** 
@neiltyson  

The film **#Gravity** should be renamed "Zero Gravity"

RETWEETS 1,312 LIKES 1,079 

11:35 PM - 6 Oct 2013

A RIDLEY SCOTT FILM

HELP IS ONLY 140 MILLION MILES AWAY



MATT DAMON

THE MARTIAN

TWENTIETH CENTURY FOX PRESENTS A SCOTT FREE / KINDERGEMINE PRODUCTION A RIDLEY SCOTT FILM MATT DAMON "THE MARTIAN" JESSICA CHASTAIN KRISTEN WIG JEFF DANIELS MICHAEL PENK KATE MARA SEAN BEAN SEBASTIAN STAN ANSEL ELWINE AND CHRIVETEL LALUFIN "PHARRY GIBSON-WELIANG" SARA JANTY VAYES AND PIETRO SCALIA AND "GEO" ARTHUR MAX AND "GEO" DANHUSE WOLSKAI AND "GEO" SIMON KINDERGEMINE RIDLEY SCOTT AND MICHAEL SCHAEFER AND ADITYA SODI AMAR RUFAM AND "GEO" ANDY WEIR AND "GEO" BREW GOODARD AND "GEO" RIDLEY SCOTT



IN CINEMAS SEPTEMBER 30 IN 3D

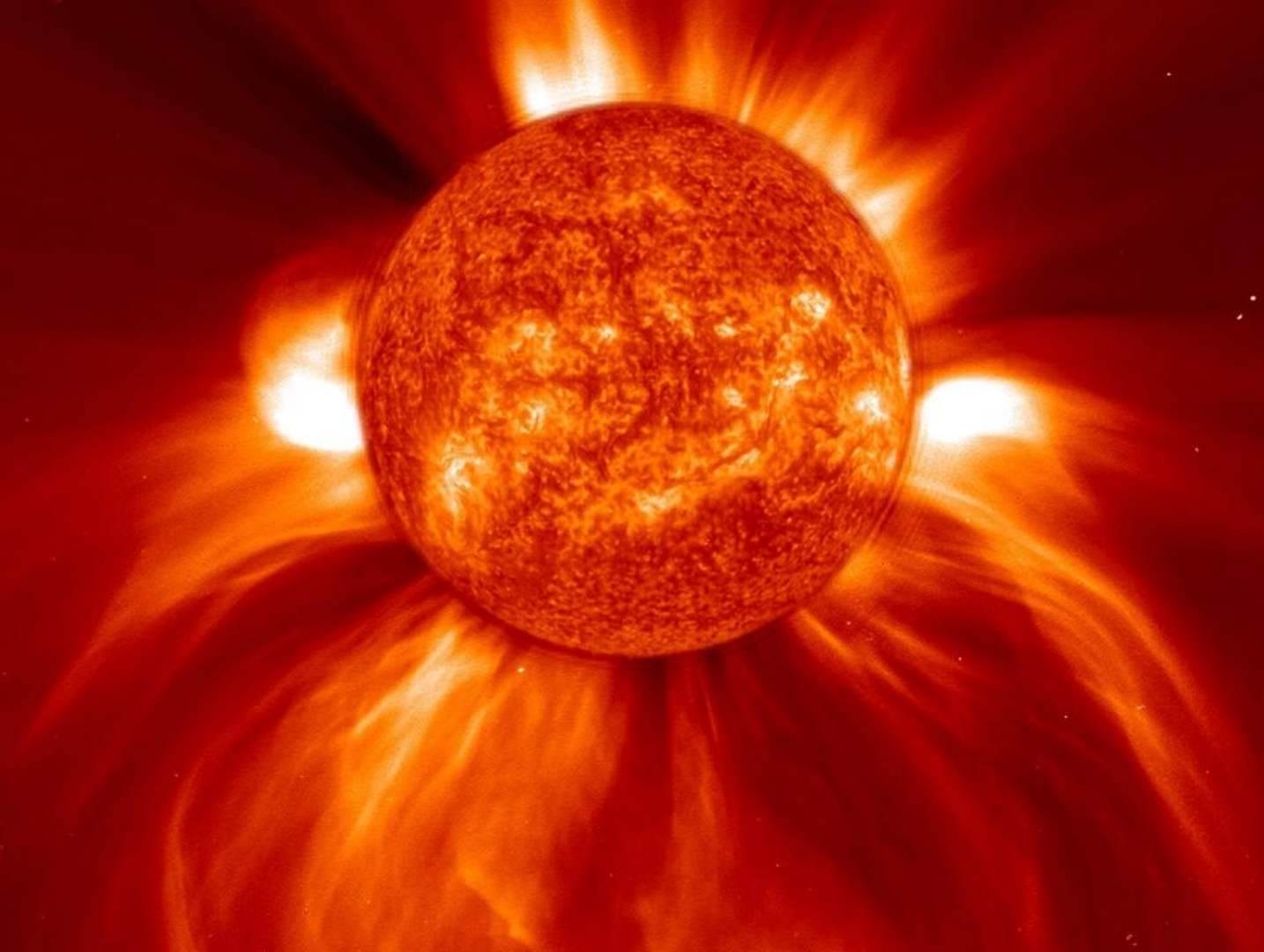
#TheMartian





Transport





The Problem of Food

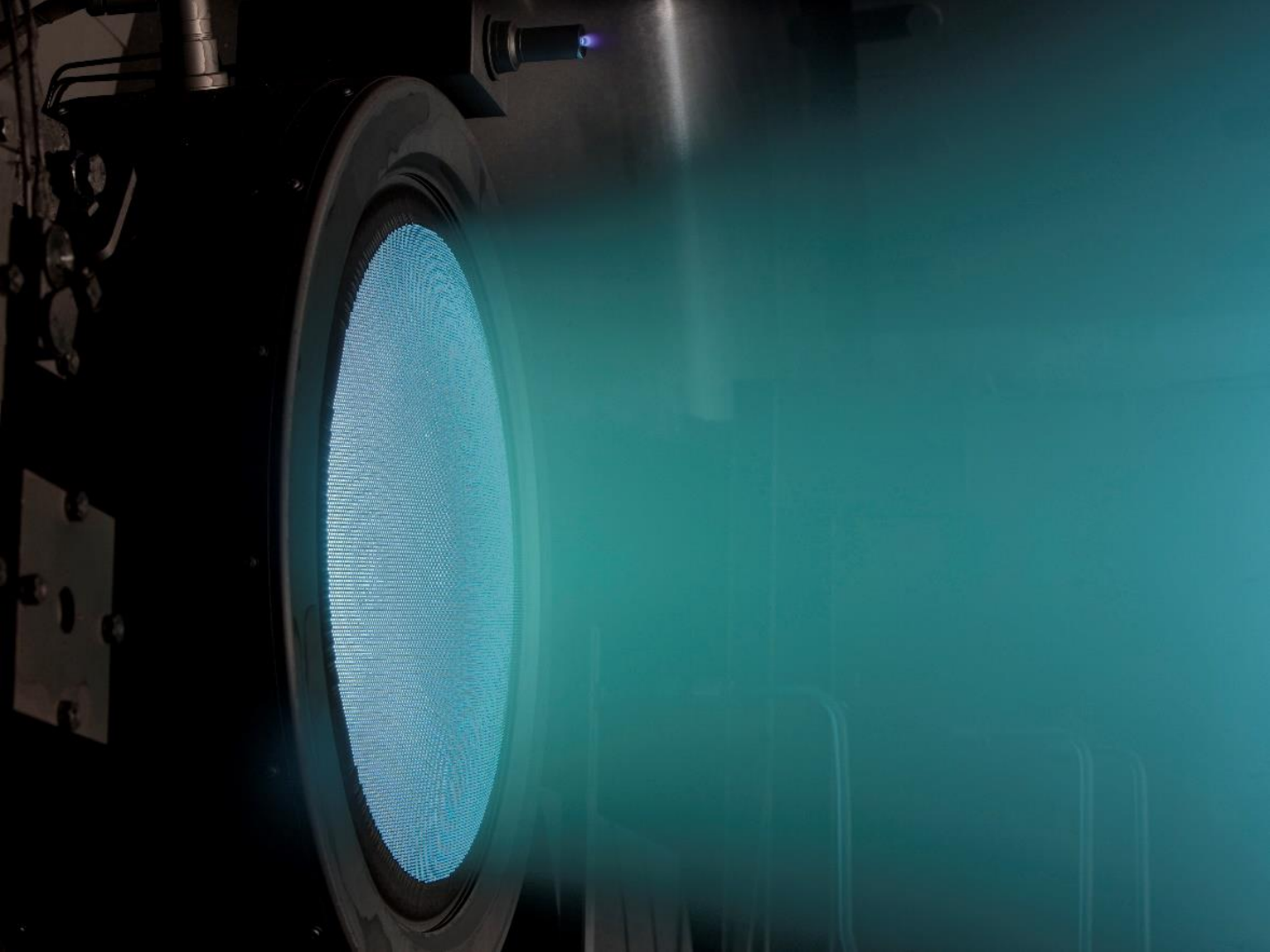


The air to breathe...

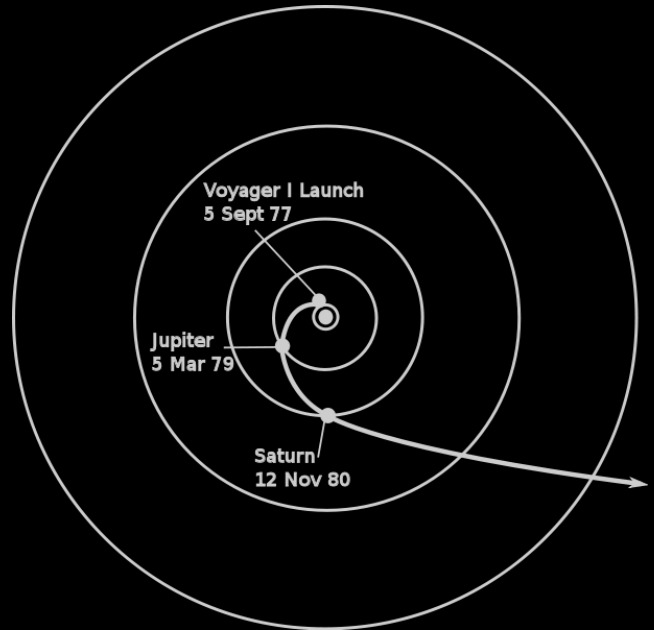
Oxygen

The Hermes





Gravity Assists/Flyby



MATTHEW
McCONAUGHEY

ANNE
HATHAWAY

JESSICA
CHASTAIN

MICHAEL
AND
CAINE



THE END OF EARTH WILL NOT BE THE END OF US.

A FILM BY CHRISTOPHER NOLAN

INTERSTELLAR

PARAMOUNT PICTURES AND WARNER BROS. PICTURES PRESENT
A SYNOPTA LINDA OBST PRODUCTIONS PRODUCTION
A FILM BY CHRISTOPHER NOLAN
CASTING BY MATTHEW MCGONAGLE
COSTUME DESIGNER ANNE HATHAWAY
EXECUTIVE PRODUCERS JESSICA CHASTAIN, BILLY BRAUN, ELLIEN BURSTYN, AND MICHAEL CAINE
PRODUCED BY MARY ZUPPES
SCREENPLAY BY JONATHAN NOLAN AND CHRISTOPHER NOLAN
DIRECTED BY CHRISTOPHER NOLAN
EDITED BY LEANNE SMITH
EXECUTIVE PRODUCERS KATHY AN GROWLEY, JONATHAN GROWLEY, DON TEXAS, BOYTERA, LISA ASHCROFT
EXECUTIVE PRODUCERS JORDAN GOLDBERG, KATHY ASHCROFT, MARY ZUPPES, MITCHELL TORNE, THOMAS STALLER
EXECUTIVE PRODUCERS JONATHAN NOLAN AND CHRISTOPHER NOLAN
EXECUTIVE PRODUCERS EMMA THOMAS, CHRISTOPHER NOLAN, LINDA OBST
PRODUCED BY JONATHAN NOLAN AND CHRISTOPHER NOLAN
DIRECTED BY CHRISTOPHER NOLAN

IN THEATRES AND IMAX

EVERYWHERE
NOVEMBER 7

interstellarmovie.com interstellar.com

MATTHEW
McCONAUGHEY

ANNE
HATHAWAY

JESSICA
CHASTAIN

MICHAEL
AND
CAINE



THE END OF EARTH WILL NOT BE THE END OF US.

A FILM BY CHRISTOPHER NOLAN

INTERSTELLAR

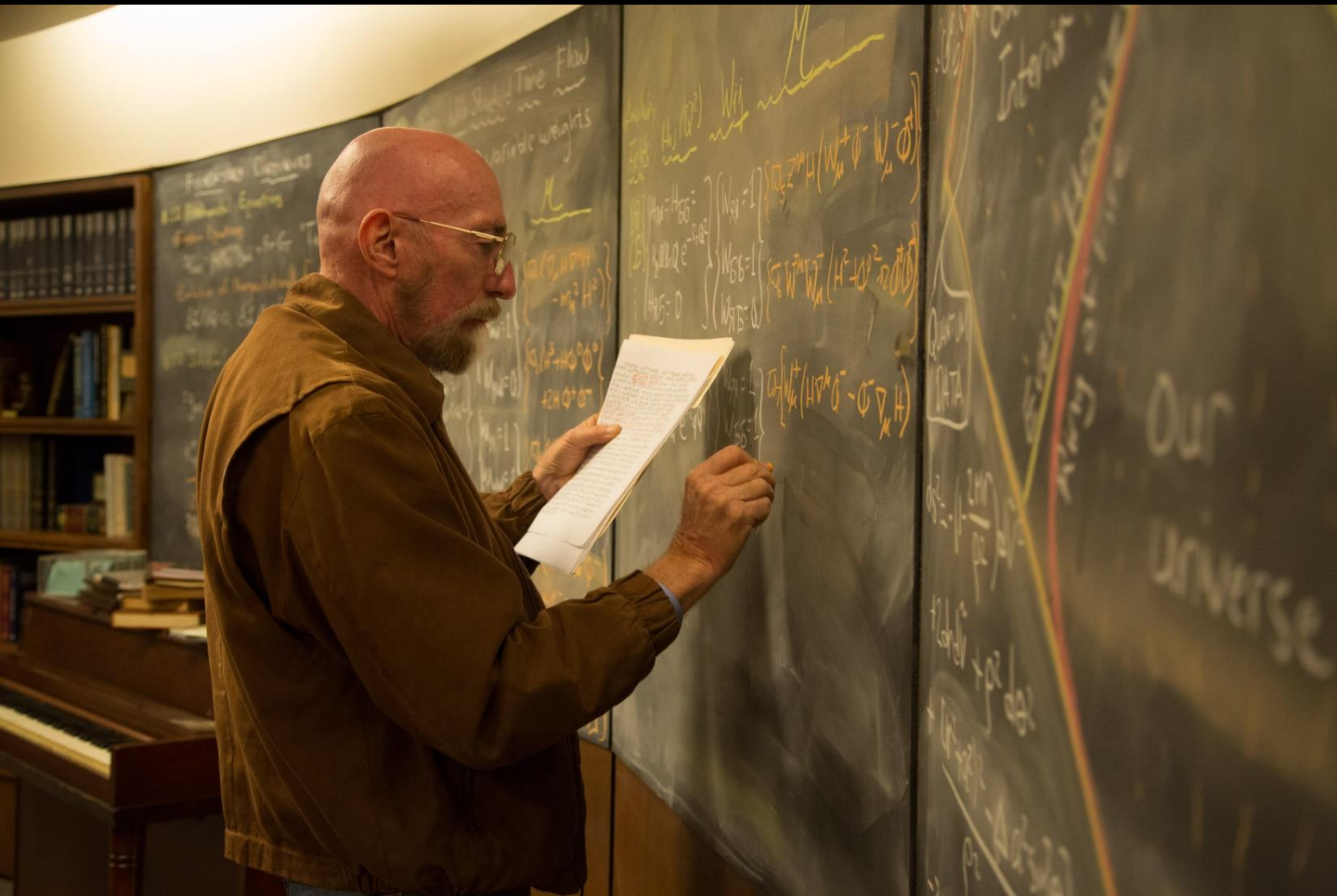
PARAMOUNT PICTURES AND WARNER BROS. PICTURES PRESENT
A SYNOPTA LINDA OBST PRODUCTIONS PRODUCTION
A FILM BY CHRISTOPHER NOLAN WITH CASTLE AIR MATTHEW McCONAUGHEY ANNE HATHAWAY
JESSICA CHASTAIN BILL IRVIN ELLIEN BURSTYN AND MICHAEL CAINE COSTUME DESIGNER MARY ZUPPES
MUSIC BY JONAS ZIMMER EDITOR LEE SMITH EXECUTIVE PRODUCERS KATHAN GROWLEY PRODUCED BY LON TEASDALE
EXECUTIVE PRODUCERS JORDAN GOLDBERG AND MARYS MITCHELL PRODUCED BY EMMA THOMAS
CHRISTOPHER NOLAN AND CHRISTOPHER NOLAN WRITTEN BY EMMA THOMAS CHRISTOPHER NOLAN LINDA OBST
DIRECTED BY CHRISTOPHER NOLAN

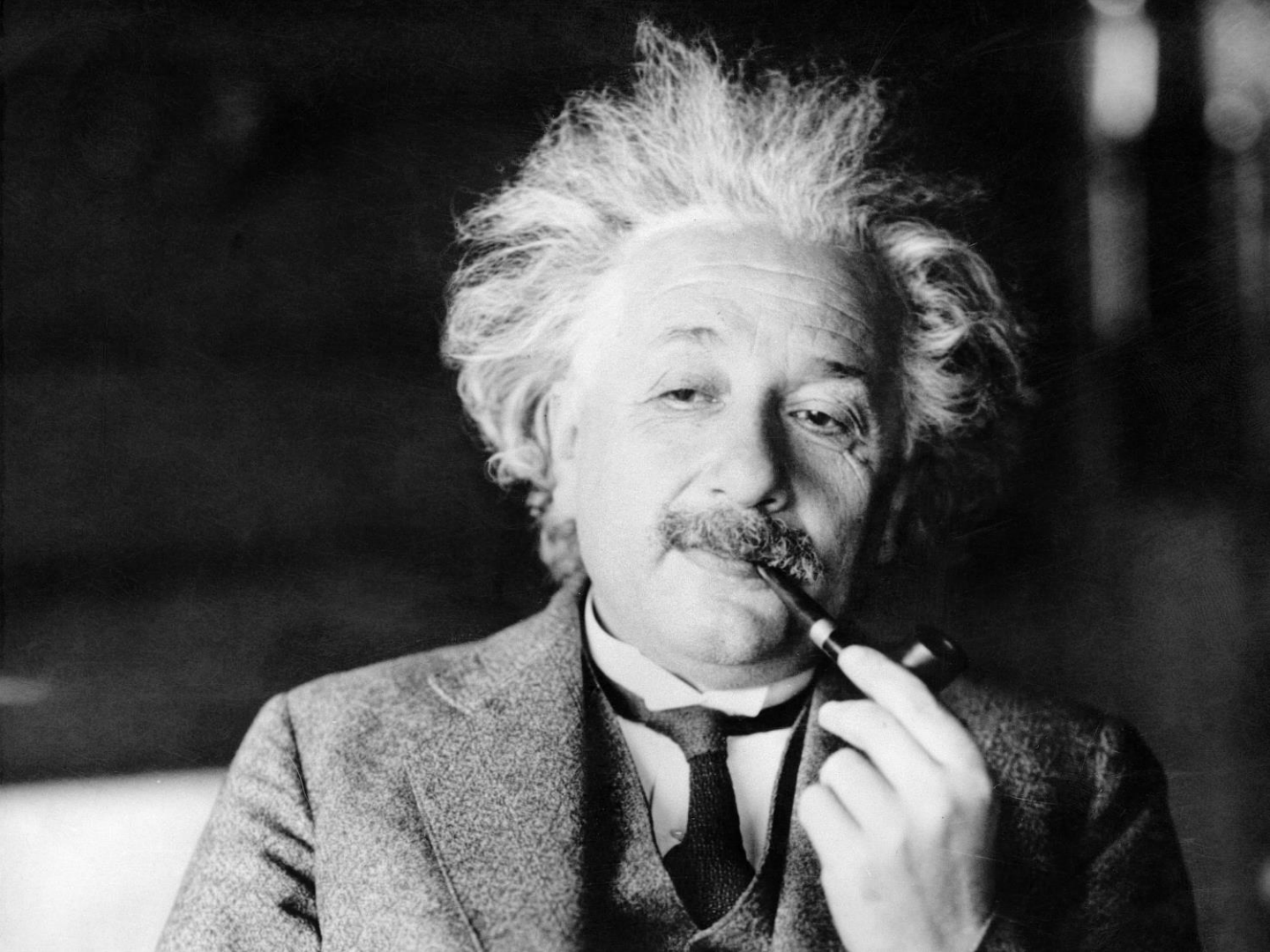
IN THEATRES AND IMAX

EVERYWHERE
NOVEMBER 7

interstellarmovie.com interstellar.com

The beginnings of Interstellar

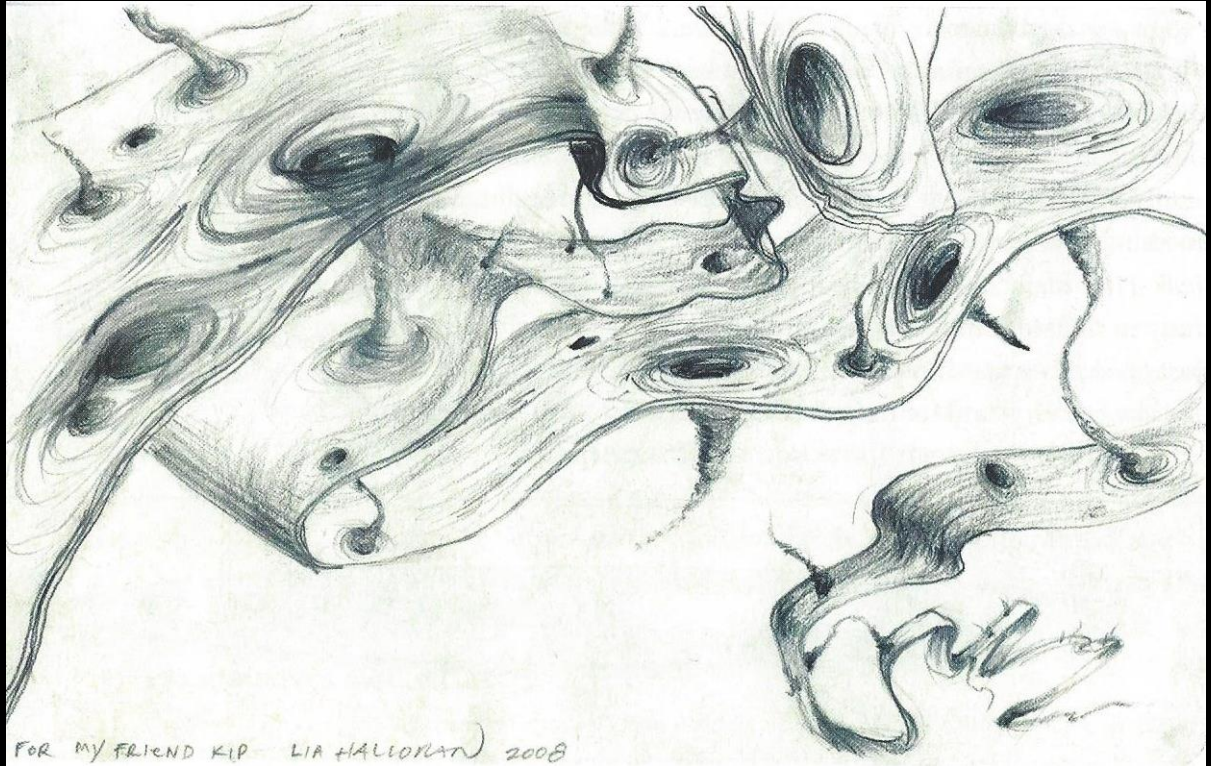




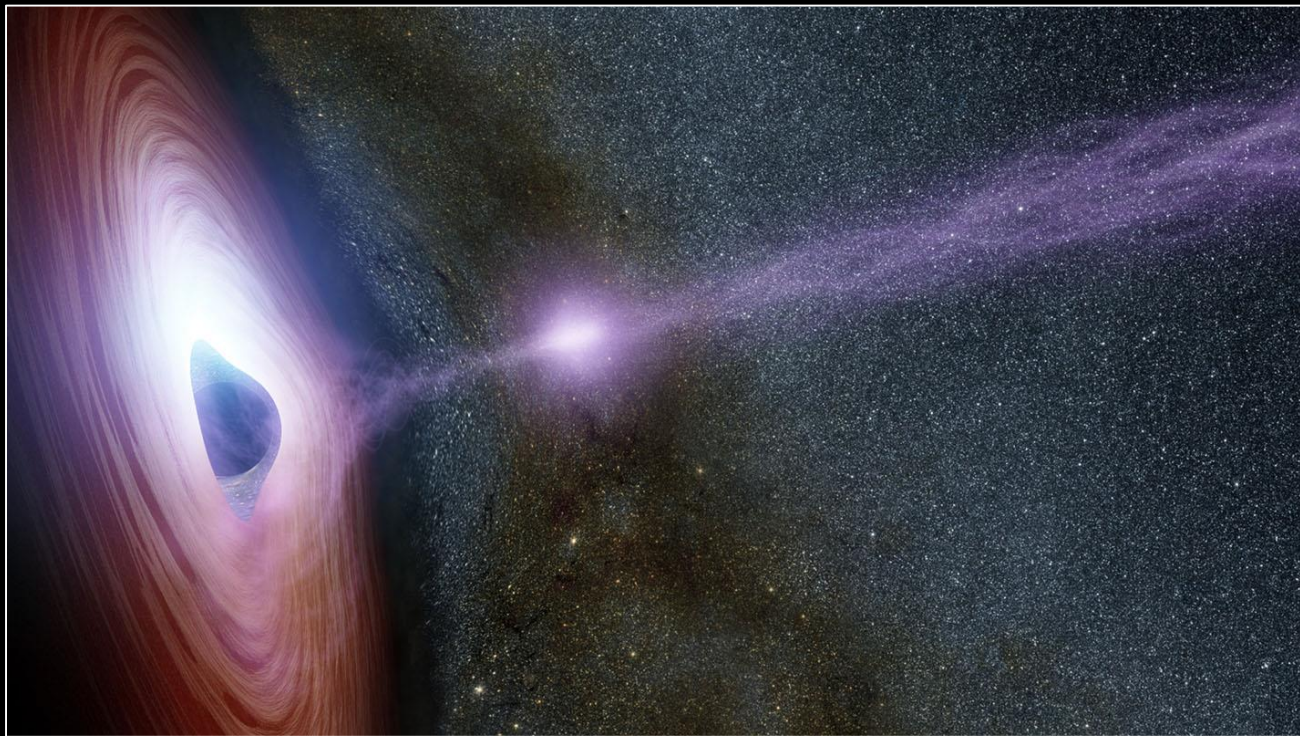
Higher Dimensions

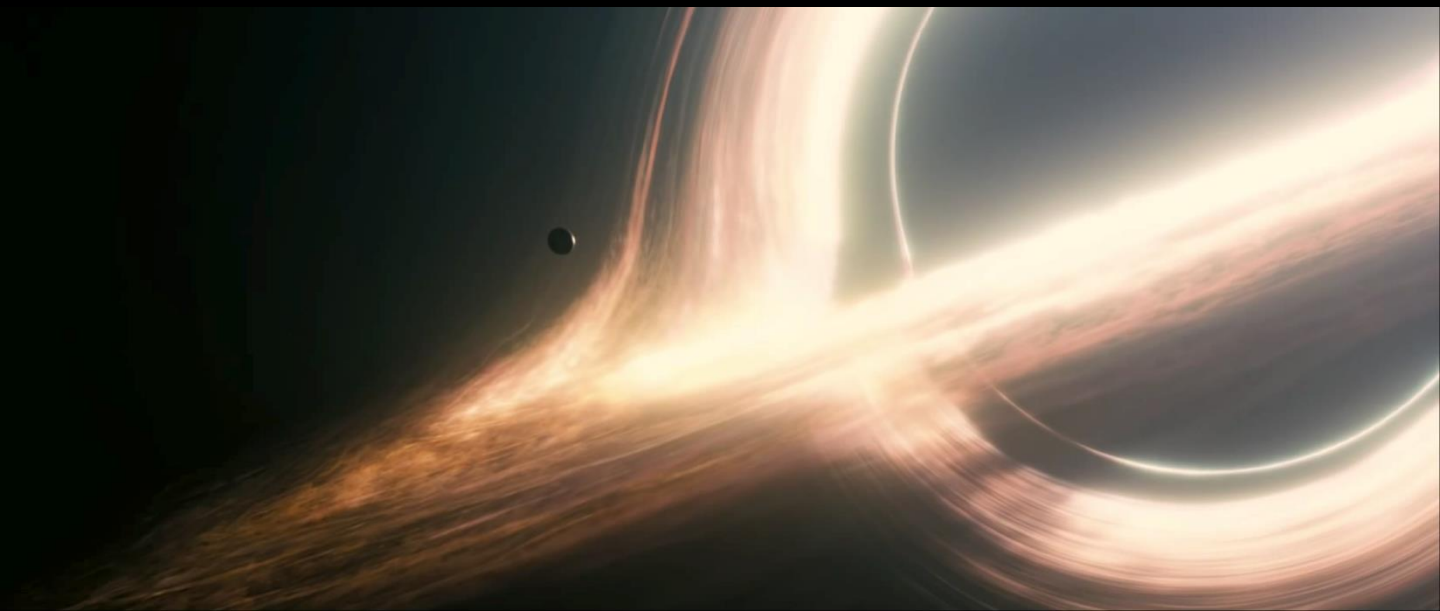
- We “experience” a four dimensional world:
 - Three dimensions in space
 - One dimension in time
- But what’s to say there aren’t other dimensions which we can’t experience
 - String theory says there could be as many as 26!

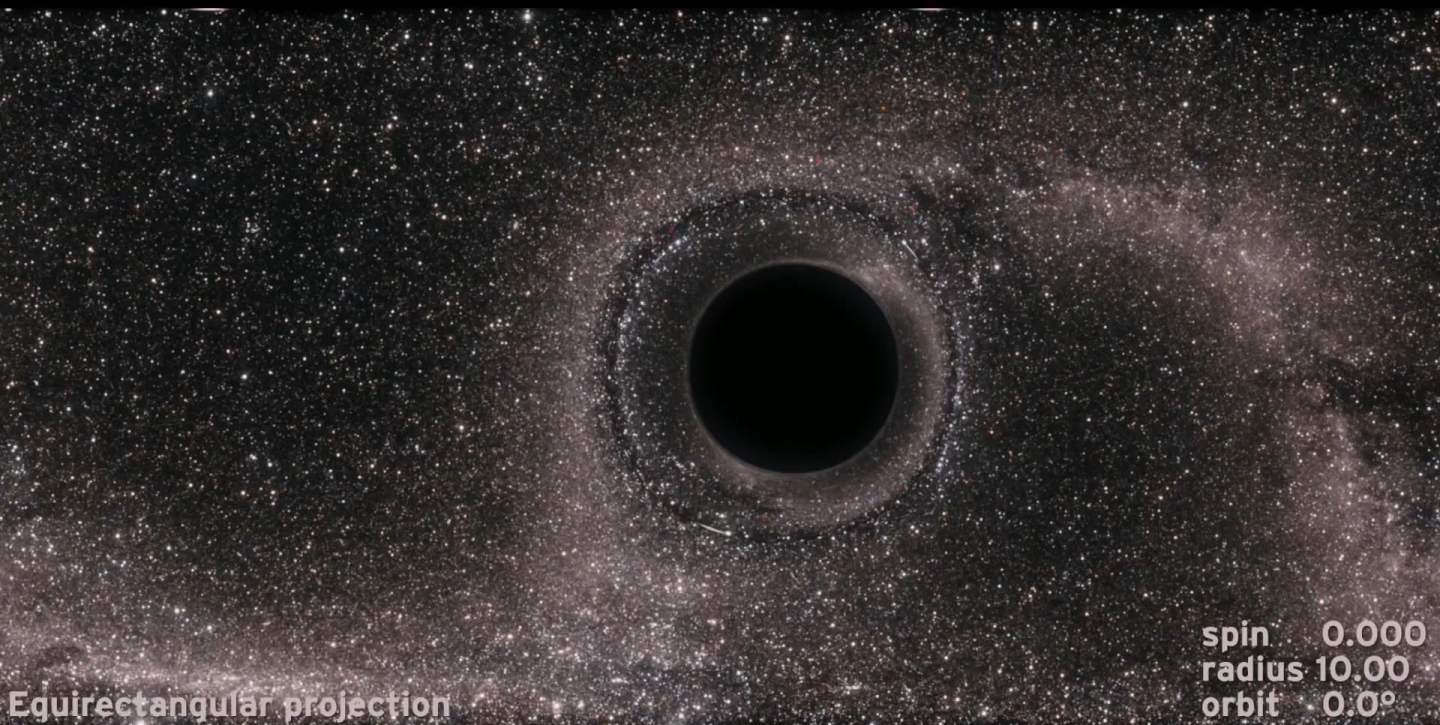
Wormholes & Blackholes



Blackholes







Equirectangular projection

spin 0.000
radius 10.00
orbit 0.0°

Time



GPS



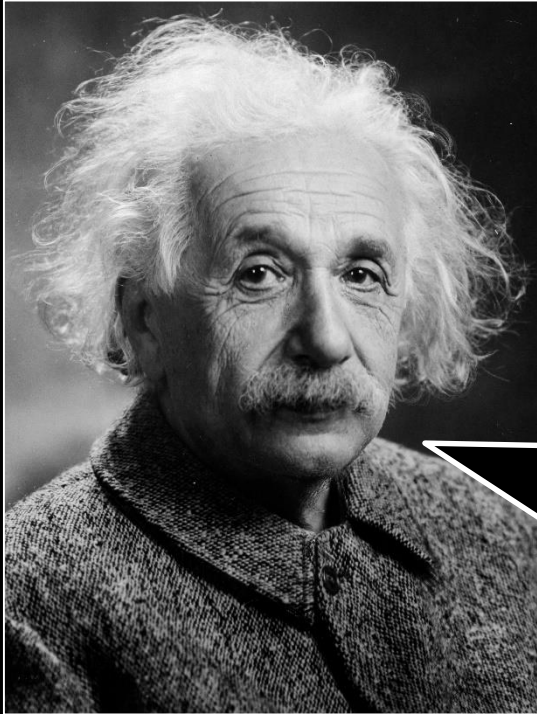
Long Duration Space Travel

- Sending humans anywhere beyond Earth takes a long time
 - You need to slow down the bodies metabolism
 - Reduces the need for food
 - Slows aging
- Therapeutic hypothermia

Mars500



Into a Blackhole...



No information can escape
from a black hole.

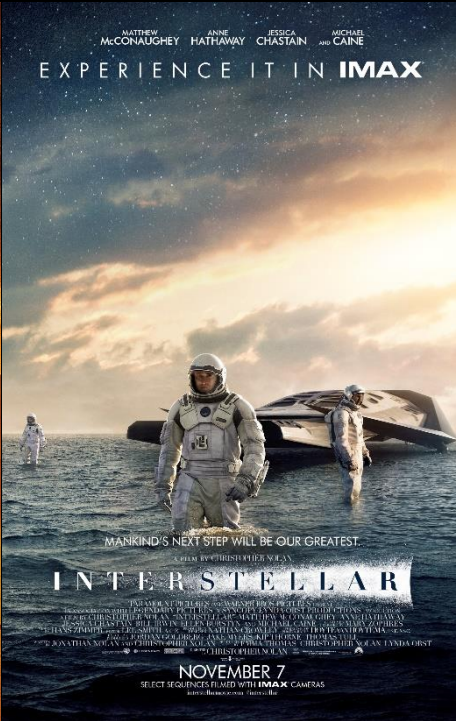
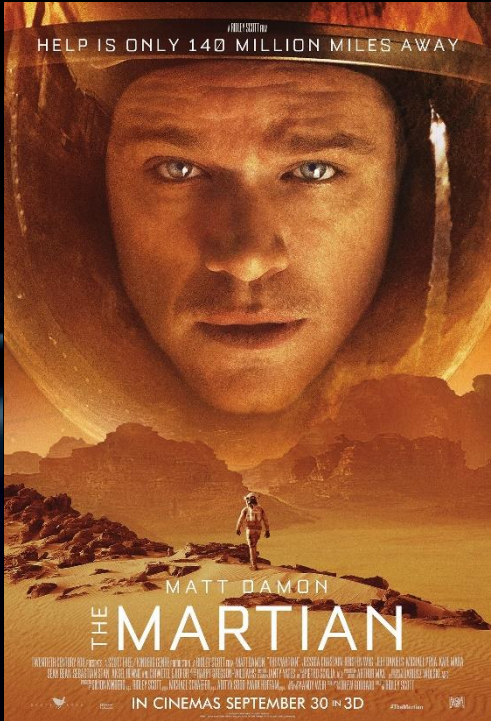
ABSOLUTELY NONE!

SPOILER ALERT:
This book explains
the fantastic climax
and ending of
Interstellar

THE
SCIENCE
OF
INTERSTELLAR

KIP THORNE

FOREWORD BY CHRISTOPHER NOLAN



Thank you