



# C O S M O S

A SPACETIME ODYSSEY

칼 세이건 살롱 2016

---

4강. 밤하늘의 유령

A Sky Full of Ghosts

---



김창규

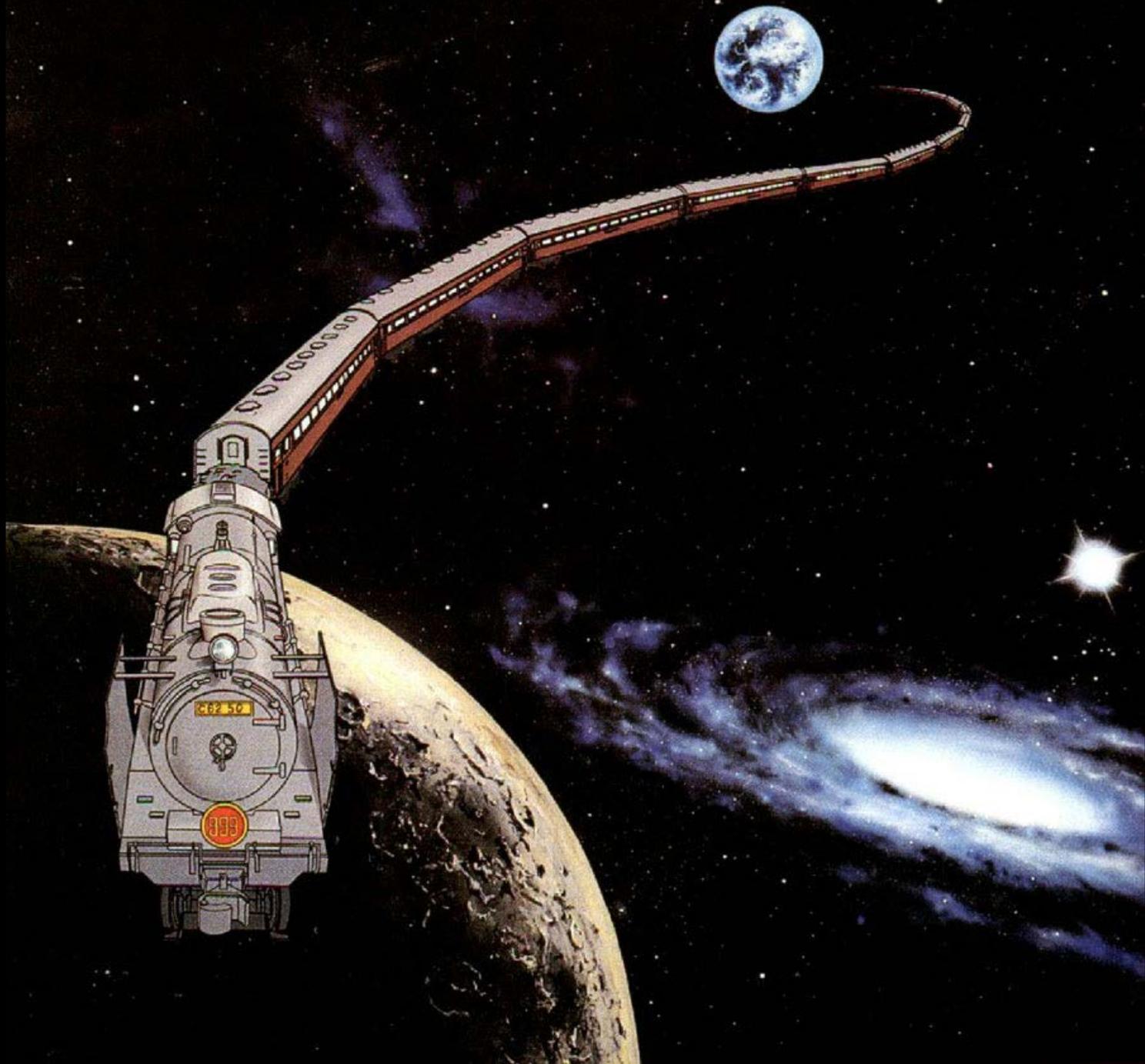
유명 SF 작가

번역가

차가운 방정식을  
가슴에 품는 존재들

-김창규-





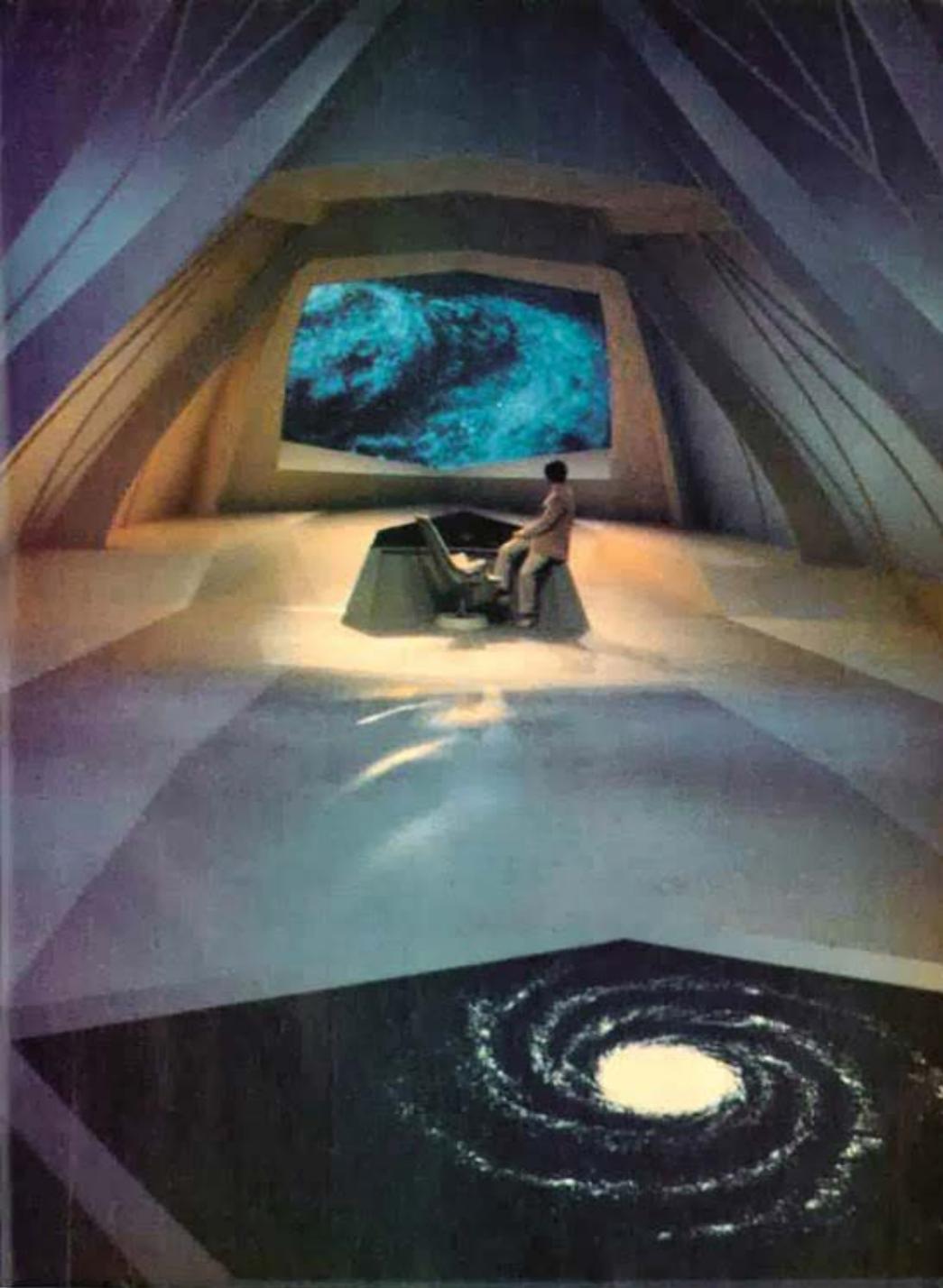


# 17 Equations That Changed the World

by Ian Stewart

1.	<b>Pythagoras's Theorem</b>	$a^2 + b^2 = c^2$	Pythagoras, 530 BC	
2.	<b>Logarithms</b>	$\log xy = \log x + \log y$	John Napier, 1610	
3.	<b>Calculus</b>	$\frac{df}{dt} = \lim_{h \rightarrow 0} \frac{f(t+h) - f(t)}{h}$	Newton, 1668	
4.	<b>Law of Gravity</b>	$F = G \frac{m_1 m_2}{r^2}$	Newton, 1687	
5.	<b>The Square Root of Minus One</b>	$i^2 = -1$	Euler, 1750	
6.	<b>Euler's Formula for Polyhedra</b>	$V - E + F = 2$	Euler, 1751	
7.	<b>Normal Distribution</b>	$\Phi(x) = \frac{1}{\sqrt{2\pi\rho}} e^{-\frac{(x-\mu)^2}{2\rho^2}}$	C.F. Gauss, 1810	
8.	<b>Wave Equation</b>	$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$	J. d'Alembert, 1746	
9.	<b>Fourier Transform</b>	$f(\omega) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \omega} dx$	J. Fourier, 1822	
10.	<b>Navier-Stokes Equation</b>	$\rho \left( \frac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v} \right) = -\nabla p + \nabla \cdot \mathbf{T} + \mathbf{f}$	C. Navier, G. Stokes, 1845	
11.	<b>Maxwell's Equations</b>	$\nabla \cdot \mathbf{E} = 0$ $\nabla \times \mathbf{E} = -\frac{1}{c} \frac{\partial \mathbf{H}}{\partial t}$	$\nabla \cdot \mathbf{H} = 0$ $\nabla \times \mathbf{H} = \frac{1}{c} \frac{\partial \mathbf{E}}{\partial t}$	J.C. Maxwell, 1865
12.	<b>Second Law of Thermodynamics</b>	$dS \geq 0$	L. Boltzmann, 1874	
13.	<b>Relativity</b>	$E = mc^2$	Einstein, 1905	
14.	<b>Schrodinger's Equation</b>	$i\hbar \frac{\partial}{\partial t} \Psi = H\Psi$	E. Schrodinger, 1927	
15.	<b>Information Theory</b>	$H = -\sum p(x) \log p(x)$	C. Shannon, 1949	
16.	<b>Chaos Theory</b>	$x_{t+1} = kx_t(1 - x_t)$	Robert May, 1975	
17.	<b>Black-Scholes Equation</b>	$\frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS \frac{\partial V}{\partial S} + \frac{\partial V}{\partial t} - rV = 0$	F. Black, M. Scholes, 1990	

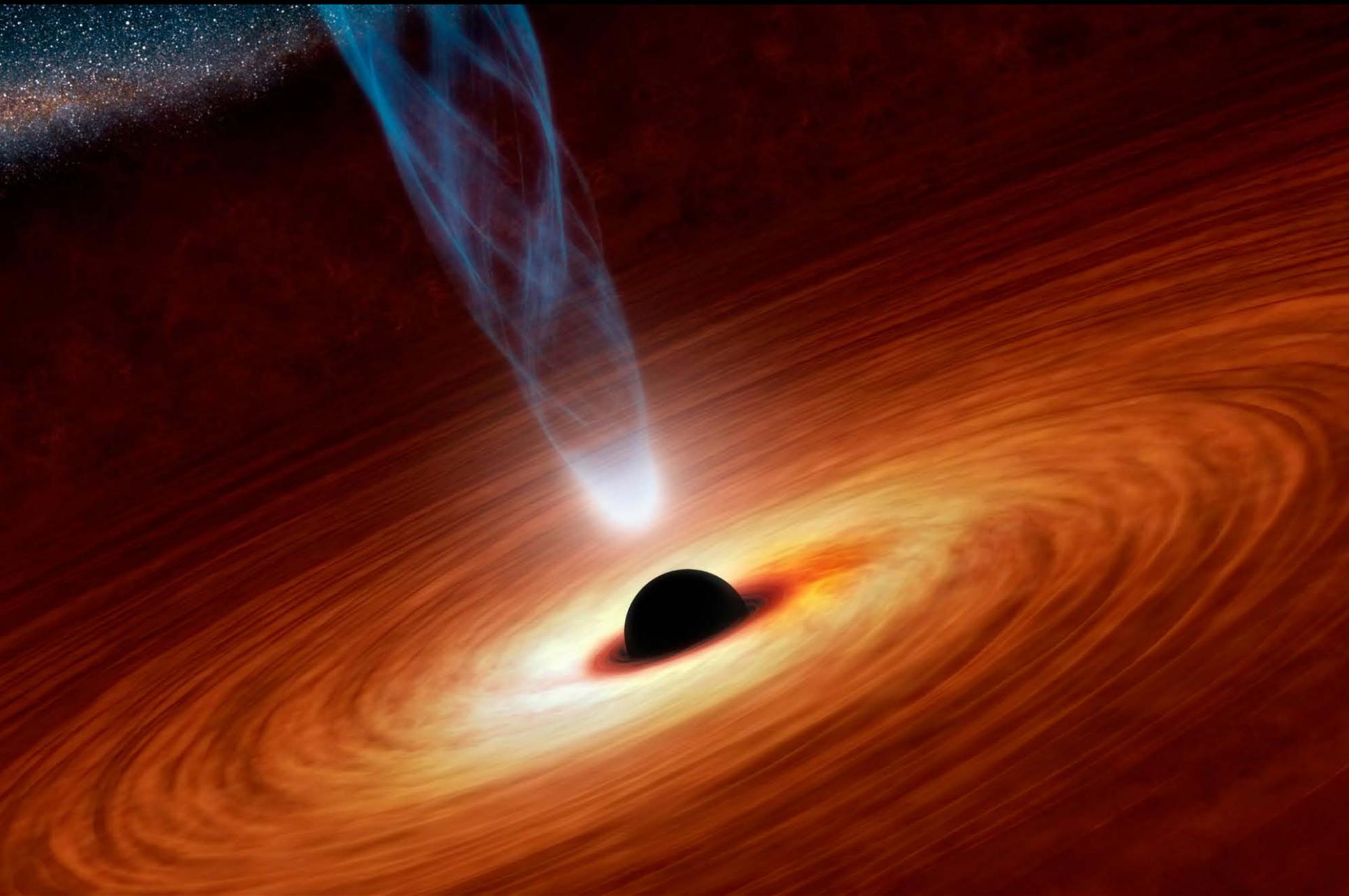


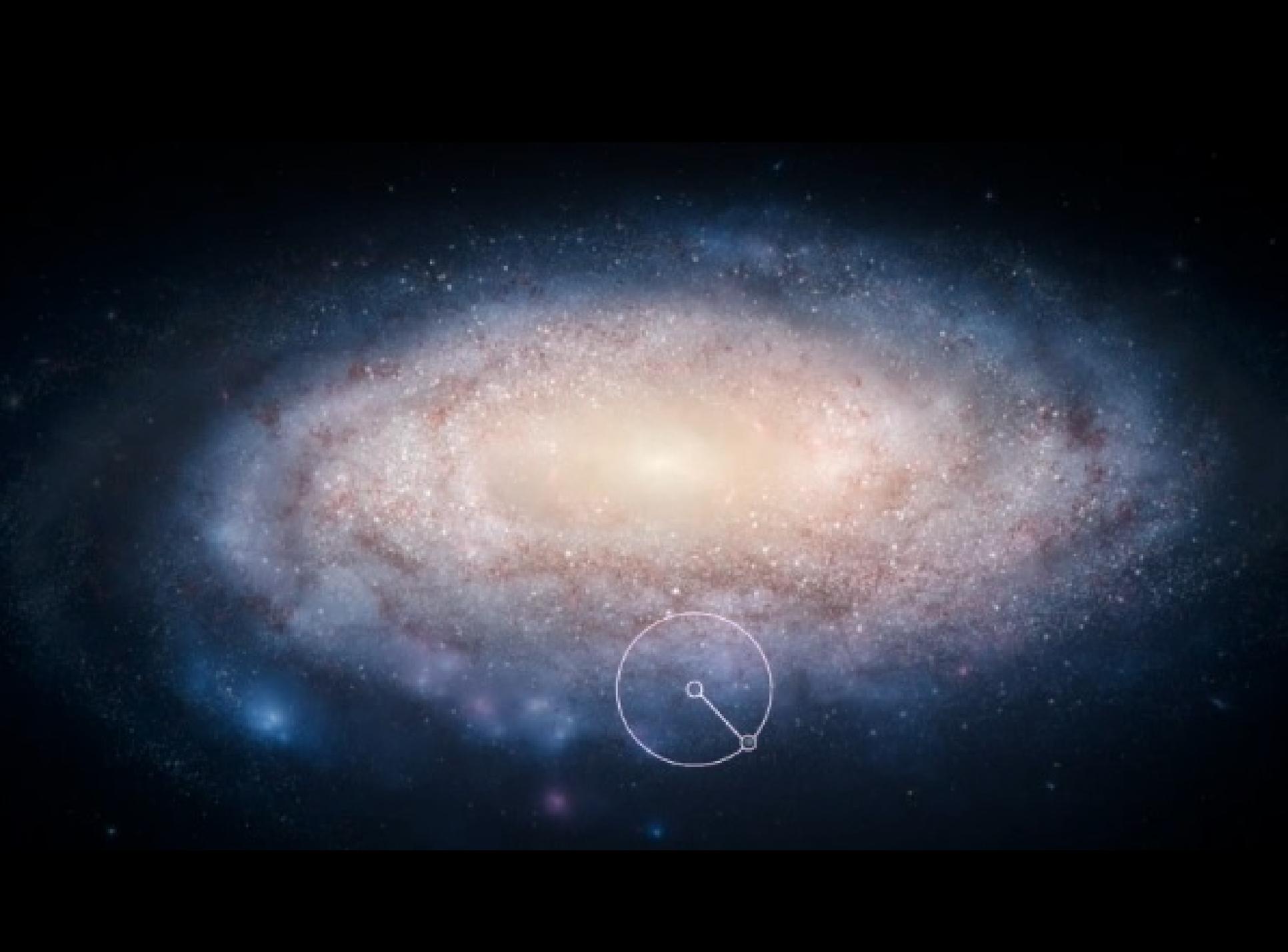


# GPS









아주 마음에 들고 안심되는 우주의 모습이 있다한들 그게 기만이라면,  
고집을 부리지 말고 우주를 있는 그대로 받아들이는 편이 훨씬 더 낫다.



It is far better to grasp the universe as  
it really is than to persist in delusion,  
however satisfying and reassuring.

*Carl Sagan*



*Not only are we in the universe,  
the universe is in us.  
I don't know of any deeper  
**spiritual feeling**  
than what that brings upon me.*

*-Neil deGrasse Tyson*

우리는 우주 안에 있고, 우주도 우리 안에 있다.  
나는 이 사실로부터 가장 큰 정신적 감동을 느꼈다.

The background of the image is a vibrant, multi-colored nebula with a central black hole. The colors transition from deep reds and oranges on the outer edges to bright yellows and oranges in the middle, and finally to a brilliant blue and white at the center. The central black hole is surrounded by a glowing blue ring of light. The word "COSMOS" is written in large, white, sans-serif capital letters across the center of the image, with the central black hole acting as a dark void behind the letter "S".

# C O S M O S

A SPACETIME ODYSSEY

 NATIONAL  
GEOGRAPHIC  
CHANNEL