

## Follow The Heart

Lincoln Stoller, PhD, 2016

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I recently discovered a piece of my own history that caused me to rewrite the introduction to my book [The Learning Project: Views of Authentic Learning](#).

I discovered that someone I briefly met and never worked with was actually closely aligned with me in almost every way. This discovery comes at a time when I'm called to follow my heart in a new way. This has reminded me of the beauty that can unfold when you do follow your heart, and it is this that has moved me.

## Where Learning Ends



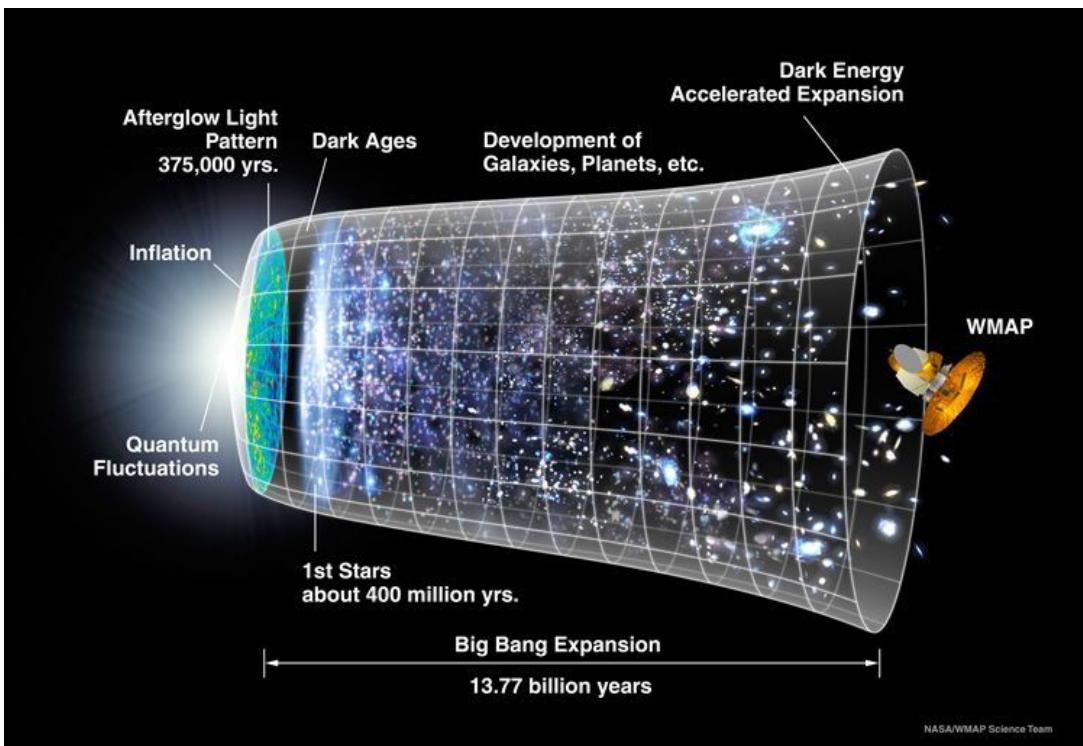
Scan ©American Institute of Physics

A young Robert Herman

In 1979 I was an incoming physics graduate student at the University of Texas when I met Robert Herman, a professor in the engineering department. He was a wonderfully sweet guy whose personality resonated with me at a deep level. I really wanted to work with him but he was on the engineering faculty and, even less useful, his field was traffic flow! We both hung around Ilya Prigogine's nonlinear dynamics group but, as his work was not in physics as far as I could tell, after an encouraging but brief conversation I never spoke to him again.

In 1948 Ralph Alpher and Bob Herman made the first theoretical prediction of a cosmic microwave background radiation pervading the universe as a vestige of the Big Bang. The Big Bang theory was unpopular at the time. No one knew how to test this prediction, and no one seemed too interested. Alpher and Herman were not high-profile scientists and

their work was passed over.

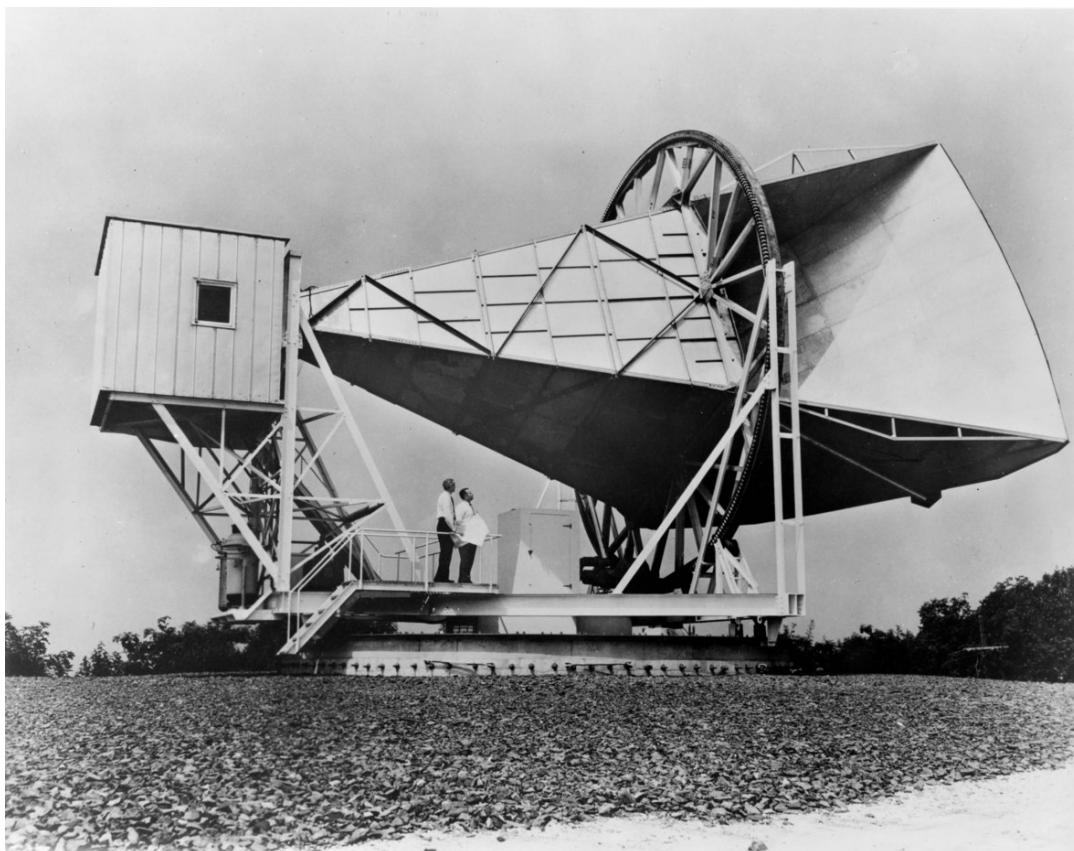


History of the universe after the Big Bang

NASA/WMAP Science Team

In 1964 Arno Penzias and Robert Wilson at Bell Labs were using an early radio antenna to look for the presence of hydrogen in inter-galactic space. No significant amounts of anything had ever been found in inter-galactic space but Penzias was continuing a search he had started as a graduate student. Bell Labs, ostensibly an industrial laboratory, was rich from their monopoly of the telephone system and they let people do this kind of crazy research.

They could not "hear" hydrogen from between the galaxies, but they did hear a pervasive and unexplainable hum from every direction. They thought this was a malfunction of their antenna. After eliminating every conceivable source of error and interference they concluded the noise was not an error, and it did not come from earth. They brought their observation to Princeton University where astrophysicists interpreted it as the predicted 13 billion year old background radiation created at the origin of the universe, but they did not mention who predicted it.



*Penzias and Wilson's Horn Antenna*

1978 the Nobel Prize for Physics was awarded to Arno Penzias and Robert Wilson for their detection of the cosmic background radiation, the first direct evidence for the Big Bang and the origin of the universe. The award did not recognize or mention the work of Alpher and Herman, which was the only thing that changed what was thought to be a puzzling error into one of our greatest observations. The omission of Alpher and Herman as co-recipients of the Nobel Prize has become a prominent illustration of the political forces that direct scientific research.

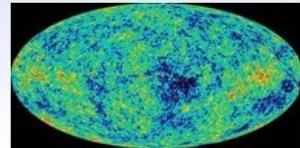
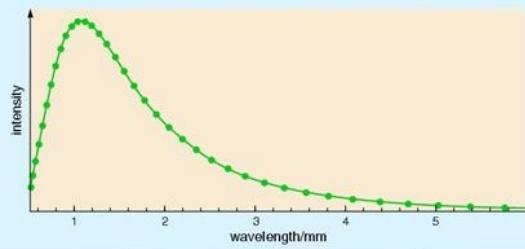
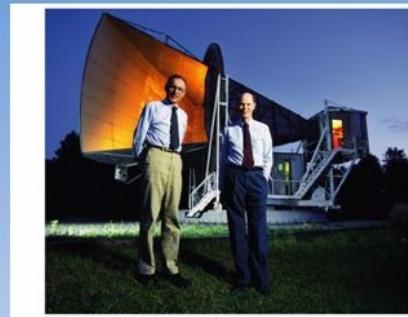
# Echoes of the Big Bang

Penzias & Wilson found a faint background 'hiss'

Leftover radiation from Big Bang!

Universe was originally filled with very high energy blackbody radiation

As Universe expanded, the radiation cooled, and predicted to be at microwave wavelengths – with T approx. 3K



In 2016, poking around in the history of science, I was startled to come upon Bob Herman. His story connected with Penzias's search for hydrogen, which Penzias began with Charlie Townes, who was his supervisor and who was the first to detect inter-stellar clouds of ammonia. I studied ammonia in the atmosphere of Jupiter when I was Townes's student. In my [interview with Charlie Townes](#) he mentions Penzias's work as an example of how one should not be afraid to follow one's heart because, even though they never found what they were looking for, they found something much more important.



*Bob Herman*

Not only was Bob Herman a physicist but he shared my history, studies, interests, background, and personality. He was a polymath, a poor musician, a critic of the educational system, and an artist of sorts; all things that I share. I have even since studied traffic flow! He was the person with whom I should have studied. At some level I knew it but didn't do it because I did not follow my heart.

Following your heart is what [The Learning Project](#) is about. Consider how these insights might be of use to you. It's your journey, and it never ends.

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