National Center
for Earth and Space Science Education
Universities Space Research Association

USRA

Visiting Researcher Profile

JOURNEY through the UNIVERSE

Dr. Nancy Grace Roman

Astronomer
Astronomy by Roman

Research Specialty: Space Astronomy

Bio

Dr. Nancy Grace Roman had the scientific responsibility for NASA's astronomy program from 1959 through 1979, although various portions of the program were split off as it grew. Her final title was Chief of Astronomy and Relativity Programs. The Hubble Space Telescope was among the many projects in her program. Since retiring from the Civil Service, she has remained involved with the NASA science program in various capacities. Before joining NASA, she taught graduate courses and did research in stellar astronomy at the University of Chicago and conducted research in radio and radar astronomy at the U.S. Naval Research Laboratory. Her BA is from Swarthmore College and her Ph.D. is from the University of Chicago. She is a member of various astronomical organizations including the American Astronomical Society and the International Astronomical Union. She is a fellow of the American Astronautical Society and of the American Association for the Advancement of Science.

Since her second retirement, Dr. Roman has been an active volunteer in a number of areas. In particular, she has worked with the *Journey to the Universe* program for a number of years, led programs in schools in the Washington D.C. area, and conducted classes for seniors, in addition to speaking to other adult lay groups. She also worked with high school students and teachers as an adjunct professor at Montgomery College.

Examples of Classroom Presentations

The Composition of the Universe **[Grades: K-2]**
What makes up the Universe? We will compare star families with human families. We will start with our solar system – the Sun and the family of nine planets. We will work our way out from the solar

system to the Milky Way and then the rest of the Universe by carrying out the analogy of a single family all the way to planets in many countries.

Where are the planets? **[Grades: 3-6]**
We will lay out a model of the solar system using scale models of the planets.

Curvature of Space **[Grades: 6-8]**
We will demonstrate how different weights curve space and why the planets orbit the sun. We will also demonstrate a way to search for black holes.

Hubble Deep Field **[Grades: 9-12]**
Acting as astronomers, we will conduct three investigations of the Hubble Deep Field, a picture containing galaxies whose light traveled for almost 13 billions year to reach our telescope. Specifically, we will use sampling to count the number of galaxies in the field, try to put some galaxies in order of distance, and describe various galaxies.

Where should we look for life in the Solar System? **[Grades: 3-5]**
What are some of the things we need for life? Where might we find life in the solar system? Why did you pick these possibilities? Why not others? These are the questions we hope to answer by discussing where life exists on Earth and the different types of habitats that support life.

The Search for Life in our Solar System and Beyond **[Grades: 6-8]**
We will review some of the places on Earth where life is found. Then, we shall list the necessities for life, as we understand it. We shall review the moons and planets in our solar system to determine on which life might be possible. Then we shall discuss how likely we think it would be to find life outside our solar system. Depending on the grade level, we may discuss the ways in which we can find extra-solar planets, whether the ones we have found so far are likely to have life, and how we would recognize the presence of life on an extra-solar planet. Finally, we shall discuss SETI (Search for Extraterrestrial Intelligence).

When does the sun rise? When does it set? **[Grades: 4-8]**
We will examine how the length of the day changes with time of the year and with latitude. We will also show that the earliest sunset is almost a month before the latest sunrise and discuss why.

A visit to a planet **[Grades: 9-12]**
Which planet would you like to visit? Why? What things would you have to consider to live for a while on this planet (that is, what do you need to stay alive for a visit)? In your packing, also consider how long it will take to get there. Hopefully, the students would not all pick the same planet. The class would be divided into groups (normally of three or four). Each group prepares a packing list for the planet they want to visit. These are then presented to the class and discussed.