

# Cosmic-ray geophysics

Department of Geology UW

May-July 2021, Wednesdays, 4 pm – 7 pm, 4 ETCS

Profesor Marek Zreda (University of Arizona)



UNIWERSYTET  
WARSZAWSKI



ZINTEGROWANY  
PROGRAM ROZWOJU

**COSMIC RAYS**, discovered by Victor Hess in 1912 (for which he was awarded the Nobel Prize in 1936), are indispensable tools for Earth and environmental sciences, used for, among others, for: dating of organic remains, dating of landforms and measuring the rates of geological processes, dating and tracing of water movement above and below the land surface, and for measuring water content and amount in different reservoirs at the land surface.

**THE COURSE** will cover the fundamentals of cosmic-ray physics and the applications of products of cosmic radiation in the Earth sciences. After a few introductory lectures each participant will have the same scientific background in the field of cosmic-ray physics. In the next part of the course the participants will analyze scientific papers and present their findings in class. They will also conduct short research projects with the use of existing data, thereby learning the methods of analysis and interpretation of data.

## SCOPE OF COURSE:

- (1) Fundamentals of cosmic-ray physics and interactions of cosmic-ray particles with terrestrial matter.
- (2) Production of cosmogenic isotopes in the atmosphere, water and rocks, and their applications in geochronology and related fields.
- (3) Interactions of cosmogenic neutrons with water on Earth, and applications in hydrology and related fields.
- (4) Measurement techniques for cosmic-ray neutrons and cosmogenic isotopes.

## STRUCTURE OF COURSE:

Lectures: 15 hours

Seminars/presentations: 15 hours

**Profesor Marek Zreda** is the leader on many aspects of fundamental and applied cosmic-ray research. He has created a new method for measuring soil water with the use of cosmogenic neutrons, and has developed the surface exposure dating method with the use of cosmogenic  $^{36}\text{Cl}$ .