This course will explore the full sweep of human engagement with the universe from the sands of the Western Sahara in 5000 BCE to Copenhagen of September 1941 CE. We start with the earliest known case of megalithic astronomy and end with one of the great puzzles of puzzles of the history of science, the enigmatic meeting of two Nobel laureates in Copenhagen. As an epilogue, we will consider the founding of the High Altitude Observatory in Boulder as an unintended consequence of anti-Nazi astronomy in Germany.


Week 1: I will start with describing the earliest examples of archaeoastronomy, with our discovery in 1997 of a ceremonial center built by nomadic pastoralists at the edge of a self-drained lake around 5000 BCE. That was a magical period for the western Sahara when monsoon rains turned the desert into a verdant landscape. There were hippopotamuses, water birds, and the construction of a ceremonial center overlooking the lake of Nabta. Other early major astronomical centers will also be covered: the temple culture of Malta, Stonehenge, and New Grange.


Week 2: In the second session I will explore the meaning behind the astronomy of the Ancestral Pueblos in sites such as Chaco Canyon (with the most monumental pre-historic structures of the continent north of Mexico), Mesa Verde, Yellow Jacket (perhaps the bread basket of the Ancestral Puebloan world), and Chimney Rock (where the moon rises between the chimneys every 18.6 years).


Week 3: The third session will provide examples of the astronomy of ancient and modern India. Indian culture is truly cosmic, with visions of vast expanses of space time, emphasizing places where I have engaged in field work, such as Varanasi, Vijayanagara (the largest ruined city of the world), the great sun temple of Konarak.


Week 4: The fourth week will cover the astronomy of the Inca and that of earlier Andean cultures, upon which the Inca built. I will recount the exciting days of 2003 leading to our re-discovery of Llaqtapata, in the cloud forest 4 miles from Machu Picchu and its sun temple similar to the Coricancha of Cusco, which was the center of the Inca cosmos.


Week 5: The fifth session will discuss the extraordinary discoveries of Johannes Kepler in the 17th century, such as his three laws of planetary motion. These have contributed to many aspects of modern astronomy such as dark matter, black holes, and exoplanets. Often described as demonstrating Kepler’s interest in astrology and astronomy, the last of his three laws contained in his 1619 book, *Harmonices Mundi*, apparently manifests his great concern for the future of humankind at the start of the disastrous Thirty Year War.

“The Harmonious Entanglement of Worlds: Kepler and the Universe.” Paper presented at the celebration of the 400th anniversary of the publication of Johannes Kepler’s *Harmonices Mundi* 21-23 June 2019, St. Petersburg, Russia

Week 6: In this week we will have a chance to discuss the controversies and uncertainties contained in Michael Frayn’s play “Copenhagen” involving Niels Bohr, Werner Heisenberg, the Nazi efforts to build an atom bomb, and the enigmas of quantum uncertainty. Recent information reveals that Heisenberg may have been single-handedly responsible for the cancellation of any German atomic bomb program. A similar anti-Nazi strategy appears to have been followed by Carl Kiepenheuer who also stayed in Germany building coronagraphs in the Alps, which, when discovered by the OSS, led to the building of the High Altitude Observatory by Walter Orr Roberts and the extraordinary fluorescence of science in Boulder.

Biographies of Carl Kiepenheuer and Walter Orr Roberts in *Biographical Encyclopedia of Astronomers*, Springer.