Address by Prof. P. van der Kruit, President of ESO's Council

Mrs. Paulina Saball, Undersecretary of the Bienes Nacionales,

Mr. Jorge Molina, Intendente of the Second Region,

Distinguished Ambassadors,

Esteemed Authorities,

Dear colleagues,

Ladies and Gentlemen,

We are children of the Universe. Actually, we are children of the universe in a very strict sense. Look at our bodies. By weight we are made up for about a quarter or so of hydrogen. The rest is in other chemical elements, of which carbon, nitrogen and oxygen are the major contributors. In contrast, the Universe, when it was about three minutes old and sufficiently cool that atomic nuclei could exist, consisted for three-quarters of hydrogen and one quarter of helium. There was no carbon, no nitrogen, no oxygen or any other chemical element except traces of lithium and boron. We now know that the chemical elements that make up most of our bodies were formed by nuclear reactions in heavy stars that live for a very short while and blow themselves up as supernovae and release the heavy elements into the interstellar gas so that new planets and possibly life can be formed. We are stardust.

Astronomy, astrophysics and nuclear physics have made it possible for us to understand how the chemical elements were formed. I regard this as one of the greatest accomplishments of science in the twentieth century. It is amazing that physical science is so powerful to make it possible for us to appreciate our origin.

Astronomers study our roots and our relation as human beings to the cosmos. But astronomy is an observational science. We will not understand the universe simply by pure thought, but rather we start by looking at it. We presently observe in the optical with giant telescopes, such as the VLT, Gemini, Keck, Magellan, etc., some of which are here in Chile. We use telescopes in space to observe at wavelengths that cannot be observed from the ground, such as in the X-ray region and the far infrared. We have built very large radiotelescopes and we have linked these or have constructed arrays, using the same principle as ALMA will use.

In the last few decades, astronomers have realized the richness of the millimetre and submillimetre spectrum and the potential for observations there to solve the current questions in astrophysics. Therefore millimetre telescopes have been built, again including one on Chilean soil at La Silla, and arrays have been constructed in particular in North-America, Europe and Japan. These already use the spectral lines that can be observed at millimetre wavelengths to study the chemical composition in regions of star formation, especially in the gas and dust in cool regions.

In spite of progress in the twentieth century, such as understanding nucleosynthesis mentioned above, there are still fundamental questions left. Some important ones among these are the following. When and how did galaxies form and in what way did early star formation and chemical enrichment take place? How do planets form around young stars? To completely solve all aspects of these and other problems we absolutely need to be able to observe at millimetre and sub-millimetre wavelengths.

I myself had the privilege as a graduate student in Leiden, the Netherlands, to have professor Jan Oort as my thesis supervisor. This was in the days of completion of the construction of the Westerbork radiotelescope and he always stressed that it was the unexpected to look forward to. So will it also be for ALMA.

In order to build an instrument like ALMA we need a site in a very dry climate, at a high altitude and with a relatively flat area with dimensions of order ten kilometres. We have been fortunate that such a unique site is in existence here in Chile at Chajnantor.

After a number of initiatives in various continents to start a project to construct a millimetre array, eventually collaboration grew out of this between North America (that is, the U.S.A. and Canada) and Europe (the member states of the European Southern Observatory and Spain; ESO states are Belgium, Denmark, France, Germany, Italy, the Netherlands, Portugal, Sweden, Switzerland and the United Kingdom). Unfortunately Japan, which was involved in the definition of the project, is not taking part now and the original plan had to be scaled down to what we call the "baseline ALMA". But we are very hopeful, and actually heard very encouraging news the last few days at the ALMA Board, that Japan will join us soon to build an even more powerful ALMA than we are constructing now.

I would like to express, also on behalf of the ALMA Board, my gratefulness to:

– the visionaries who believed ALMA was the biggest step astronomy could make at the present time and never gave up to try to convince others;

– the scientists and engineers that believed in it and showed that ALMA is possible technically and financially;

– administrators and politicians that also believed in it and convinced ministers and high officials that ALMA should be funded;

– authorities that solved political and legal problems;

– and last but not least everyone at whatever level, in whatever capacity and from whatever country that contributed in whatever way to the fact that today we can formally start the construction of ALMA.

A los Chilenos y particularmente a la gente de la comuna de San Pedro: Muchas gracias por su cooperación en este lugar tan único y para permitir el desarrollo de la astronomía en su territorio hermoso. Estamos agradecidos y les deseamos todo lo mejor.