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Dr. John P. Holdren
Director – Office of Science and Technology Policy
The White House
1600 Pennsylvania Ave. NW
Washington, DC20500, USA

Cc:
Dr. Alvaro Gimenez
Director of Science and Robotic Exploration
European Space Agency
8-10 Rue Mario Nikis
75738 Paris Cedex 15, France

RE: The James Webb Space Telescope

Dear Dr. Holdren,

We are members of the European astronomical community and we are greatly concerned with the fate of the James Webb Space Telescope (JWST). We understand that JWST is in danger of cancellation and we are writing to express, like many other colleagues all over the world, our strongest support for its science.

Europe has contributed to the development of JWST with the construction of the spectrograph NIRSPEC and a 50% share of the camera/spectrometer MIRI and will provide the launch facilities and rocket. We expect our joint efforts to be rewarded by the unprecedented power of JWST observations.

JWST is planned as the next major space observatory and will revolutionize fundamental astrophysics. Fifteen years after its selection, the science case is even stronger. No other facility, existing, planned or in construction, will match JWST capabilities. It will have 7 times the light grasp of Hubble, and 50 to 100 times the sensitivity of the Spitzer infrared space telescope. With sky background levels lower than any terrestrial observatory, JWST will outperform at infrared wavelengths any conceived ground-based telescope with mirror diameters up to 30-meters.

JWST is considered of the highest priority in the plans of European astronomical institutions, as stated for instance in the European Astronet Roadmap published in 2008, the equivalent of the US Decadal Survey. JWST was the highest priority recommendation of the US 2000 Decadal Survey, Astronomy and Astrophysics in the New Millennium. Its observations will be essential to the Astro2010 themes, Cosmic Dawn: Searching for the First Stars, Galaxies and Black Holes, and New Worlds: Finding and Preparing to Characterize Nearby Planets like Earth. The synergy between JWST, the joint American-European-Japanese ALMA array and 30-meter class ground-based telescopes will allow

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for the first time ever to witness directly the formation of stars and planets at the present time and at the dawn of the Universe.

JWST will provide breakthrough observations of the first stages of galaxy formation. In 20 years, Hubble has detected no more than a handful of galaxies at redshifts $z > 8$. A single deep field on JWST will likely resolve 30-50 galaxies at $z = 10$, when the universe was 500 million years old. JWST has the potential to reach redshifts $z \sim 20$, pushing to within 200 Myrs of the Big Bang.

JWST will provide crucial insight into the complex processes of star and planet formation. Coronagraphic imaging of individual protostars at mid-infrared wavelengths will reach contrast ratios from 10^{-5} to 10^{-8} at separations from 1 to ~ 4 arcseconds. As a result, JWST will resolve detailed structure in protoplanetary disks, and obtain spectra of jovian-mass gas giants around young stars within ~ 100 pc of the Sun.

JWST will be a unique asset for characterizing the atmospheric properties of transiting planets. Indeed, JWST offers the only foreseeable prospect of probing the atmospheres of earth-like planets. Hubble and Spitzer played a pioneering role, detecting atomic and molecular species in a few systems. JWST will probe many more systems, expanding coverage to smaller planets around smaller stars.

Like Hubble, Chandra and Spitzer, JWST will be a general-purpose observatory, with broad and even transformative impact in almost every branch of astronomy. Its versatility will allow it to exploit emergent new scientific areas, whether in dark energy, cosmology, stellar, exoplanet or solar system research. Its extraordinary capabilities will ensure that western scientists remain at the forefront of astrophysical research in the coming decade.

Space-based astronomy is a key player in bringing science to the public. Hubble, Chandra, Spitzer, Herschel and Planck have transformed the way that we view the universe, and brought images of complex astrophysics phenomena into the daily lives of non-scientists. Like those observatories, JWST will not only inspire a new generation of students and scientists, but astound and excite the public at large. If JWST is cancelled, its loss would be a serious setback for science as a whole.

Bologna, September 8th 2011

Monica Tosi
(Chair of the INAF Scientific Council)



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