

# Humboldt Highway II - a computer cluster on renewable energies

Bulletin 1

**Introduction:** In 2013 a scientific exchange between the InSTEC institute of Havana University and DESY started, first with summer-students who joined the DESY summer-student program. Since then, many students visited DESY in person for the summer-student program, and several started a PhD at DESY and University Hamburg. Since 2017 we have regular visits from senior scientists of InSTEC.

In order to allow more continuous scientific exchange over the whole year, as well as to allow more students to participate in international scientific discussions, DESY and Havana University initiated the “Humboldt Highway” project which aims to establish and to operate reliable and stable internet connection for scientific exchange between Havana University and DESY.

With the Humboldt Highway project we intent to launch intense scientific exchange between DESY/University Hamburg and Havana as well as to initiate scientific schools to teach and educate students in Cuba. We intent to create a phenomenological theory group in the area of Quantum Chromo Dynamics at the InSTEC institute of Havana University to allow participation in particle physics phenomenology projects at DESY as well as to participate in particle physics experiments at the Large Hadron Collider (LHC) at CERN in Geneva.

Internet connection is the crucial element in todays scientific exchange. During the pandemic it became even more obvious, that without the possibility to participate and to hold video conferences the digital-divide would even further decouple countries like Cuba from any development.

The Humboldt Highway project is also seen as a contribution against the isolation of Cuba as a consequence of the embargo against Cuba. It will allow the scientific community as well as students in Cuba to take part in international collaborations. The Humboldt Highway project is fully inline with the bilateral relations between [Germany and Cuba](#).

The Humboldt Highway project aims against a brain-drain from Cuba to Germany, and intents to build and develop the scientific structures inside Cuba.

**Scope of the workshop:** While we progress scientifically very fast when scientists come in person to DESY Hamburg, the progress is slowed down when they are back in Cuba, since the internet connection and computing facilities are limited. Even the satellite system operated from [StarLink](#) is not accessible from Cuba<sup>1</sup>. Therefore to help to advance scientific development in and from Cuba, the only practical and short-term option is to construct and operate computing facilities on site.

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<sup>1</sup> Email exchange with StarLink office on 2023-06-01

Since delivery of energy is still much affected by the blockade against Cuba, and power-cuts are happening regularly to ensure energy supply for critical infrastructure, like hospitals etc, a computer cluster should be operated independent from the public electricity circuits. The geographical location of Cuba makes the use and solar-energy applicable.

With the support from [HamburgAmbassador](#) a small workshop "[Humboldt Highway II - a computer cluster on renewable energies](#)" will be organized at DESY, Hamburg, on 2-3 August 2023<sup>2</sup>.

The idea is to discuss possibilities to build a (small) computer cluster which runs fully on renewable energies to support the scientific exchange program between scientists in Cuba and in Hamburg.

IT experts from CERN and DESY will report on the operation of computer clusters and their energy consumption. Ideas will be presented how to synchronize the energy consumption with the amount of available energy by either reducing the frequency at which CPUs are operated or by just switching off parts of the cluster. A new philosophy of operating computer clusters will be discussed: instead of requesting energy to fulfill the computing tasks, the availability of energy will dictate the operation of the cluster. While such thoughts will become important for the energy transition discussed also in Europe, it is absolutely vital for a country like Cuba with limited energy resources.

We will discuss with experts from [SolarZentrum](#) and photovoltaic the potentials to operate a computer cluster.

We plan to discuss with responsables from funding agencies the possibilities to support such a project in Cuba, also as test-case for operating a computer cluster in Europe.

**Outcome:** Concrete plans for constructing and operating a scaleable computer cluster at the InSTEC institute at Havana University for on-site applications of Monte Carlo simulations in the field of elementary particle physics. This computer cluster will also serve as a testing field under real conditions to operate a computer cluster based on the availability of energy in contrast to operating on computing demands.

The collaborative effort of IT centers at European research laboratories and Havana university will be major step for basic sciences for a sustainable development (IYBSSD)<sup>3</sup> as well as to contribute directly to overcome the digital-divide between countries.

### Organizers:

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In case of questions please contact [Hannes Jung](#)

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<sup>2</sup> Link to the workshop: <https://indico.desy.de/event/39544/>

<sup>3</sup> [International Year of Basic Sciences for Sustainable Development](#)