Snowmass2021 Letter of Interest : Making the Most of Our ("Old") Computing Resources

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Thematic Areas:

☐ CommF1: Applications & Industry
☐ CommF2: Career Pipeline & Development
☐ CommF3: Diversity & Inclusion
☐ CommF4: Physics Education
☐ CommF5: Public Education & Outreach
☐ CommF6: Public Policy & Government Engagement
■ Computing Frontier

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Abstract: We use a lot of computer in particle physics and rely on this equipment being performant to execute our research program. However, the effective lifetime of these machines can be extended by repurposing them for educational uses, either in the US or in developing nations. This can both bring technological justice and digital literacy to marginalized communities and seed new relationships that can grow into future research collaborations.

Personal computers, increasingly laptops, are a critical component of every particle physicists toolkit, even if only for communication purposes. They are either privately owned and used both for work and personal purposes or they are provided by a laboratory or university and are either tied to a funding source or contract duration. In any case, after a period of a few years, given our extreme reliance and need for ever increasingly performant machines, these PCs no longer serve *our* needs. We then likely either (1) throw it away or recycle it, (2) return the machine to the lab/university or (3) keep the laptop in our personal belongings where it collects dust. We posit that there is a more constructive and broadly beneficial future for these machines.

At the same time, a national and global inequality exists in the form of access to what we consider to be essential technology. In the United States, greater than 20% of households do not have access to a personal computer[1] and worldwide the figure increases to greater than 50%[2] as of 2015[3]. This stands as a "technological injustice" and is particularly true throughout an individual's education. Those with computers have the ability to excel and develop what are becoming increasingly critical skills and intuitions in the digital economy while those who do not have access to this technology are set at a critical disadvantage upon entering adulthood. This has been brought into stark contrast throughout the course of 2020 as the entire world has been forced to migrate to the virtual/digital world during the Covid-19 pandemic thereby amplifying this social injustice for children and families who do not have access to technology for remote learning.

Our field is in a position to address this inequity in access to personal laptops, thereby both addressing this fundamental injustice and increasing the ability for individuals to become trained in the skills necessary to put them on a trajectory to be recruited into the particle physics community.

There exist multiple anecdotal experiences of individuals who have arranged the ad-hoc donation of computer equipment globally that demonstrate the ability of the community to make this happen. In 2019, staff scientist Markus Joos from the micro-electronics group at CERN facilitated the donation of 12 de-commissioned servers to a university in Sri Lanka. Though this donation was not in the form of laptops, it demonstrates the ability of laboratories to navigate potentially complex bureaucratic systems to achieve humanitarian goals. This is a common occurrence in recent history at CERN and has occurred numerous times with donations to Egypt[4], Nepal[5], the SESAME program[6], and Ecuador[7]. Also in 2019, Sam Meehan and Claire David facilitated the donation of twenty laptops, acquired through personal donations and a US high school, to a junior high school in rural Ghana. The laptops were pre-loaded with educational materials in the form of the kiwix platform[8] to enable effective usage in the case of poor internet connections. This demonstrates the grassroots ability to successfully enact such programs. More formally, and local to the US, the Laboratory Equipment Donation Program (LEDP)[9] exists which serves to facilitate the donation of used laboratory equipment to schools, albeit for a limited duration. Moreover, there is additional experience from Sandia National Laboratory which has established an annual K-12 Computer Donation Event[10] which serves the local community in New Mexico. All of these examples demonstrate the motivation and ability of our community to more fully utilize its physical computing resources to enact social justice in a broad

[1]https://www.census.gov/content/dam/Census/library/publications/2017/acs/acs-37.pdf
[2]https://www.statista.com/statistics/748551/worldwide-households-with-computer/
[3]https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/
[4]https://home.cern/news/news/computing/donation-cern-computing-equipment-egypt
[5]https://home.cern/news/news/computing/cern-donates-computer-equipment-nepal
[6]https://home.cern/news/news/computing/servers-sesame
[7]https://home.cern/news/news/computing/cern-donates-computing-equipment-ecuador
[8]https://www.kiwix.org/en/
[9]https://apps.orau.gov/LEDP/
[10]https://www.energy.gov/articles/sandia-gears-annual-computer-donation-event

way.

    This Letter of Intent proposes to explore the creation of a DPF-supported program to facilitate the donation of personal and professionally owned laptops, at the point that they are deemed "unusable for science," to schools and individuals for educational usage. We will explore existing programs that attempt to fill this niche (e.g. ComputerAid[11]) and understand better how our community can tie into those programs. We will explore the bureaucratic logistics of procuring used laptops from universities and national labs and what contingencies accompany such procurements. We will work to design a "starter pack" that provides the recipient with a core set of open-source software to aid in their initial computer-education. And finally, we will explore how the establishment of such a program can provide a means by which individuals can more pragmatically integrate their research activities with the mission to increase activities surrounding diversity, equity, and inclusion goals described as central to the mission of HEPAP[12] that has been established in the recent past.

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[11] https://www.computeraid.org/

[12] https://science.osti.gov/-/media/hep/hepap/pdf/202007/14-Carruthers-Diversity$_Equity_and_Inclusion_in_the_DOE_Office_of_Science.pdf?la = enhash = C0BF29C74FE960DD64EEC2DB327BEDB09C14816D$