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Redsun: composition-based application

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In the field of microscopy, software control and hardware orchestration has becoming a blunder for many scientists: it is easy to build a new experimental setup but there are very few customizable software solutions that can adapt to the specifics of new implementations. On the other hand, Bluesky has greatly simplified the design of experiments through the usage of generator plans, and it shifted hardware integration from an inheritance-based approach (very common in microscopy) through a composition-based one by leveraging Python protocols - providing an enhanced flexibility in define the scope of a hardware device. Redsun is an attempt to address the gap in orchestrating hardware components and real-time data processing for lab-bench setups, adopting the same strategies and philosophies but from a software architecture perspective. Inheriting the Model-View-Presenter of its spiritual predecessor, ImSwitch, and following the plugin system implemented in napari, Redsun is designed to build dynamic applications that combine different software components, each shipped independently, with clear and documented input/output communication interfaces, and that leverage the Bluesky event model to share data between different points of the application.

Author: ABRAMO, Jacopo (Leibniz-IPHT)

Presenter: ABRAMO, Jacopo (Leibniz-IPHT)

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