

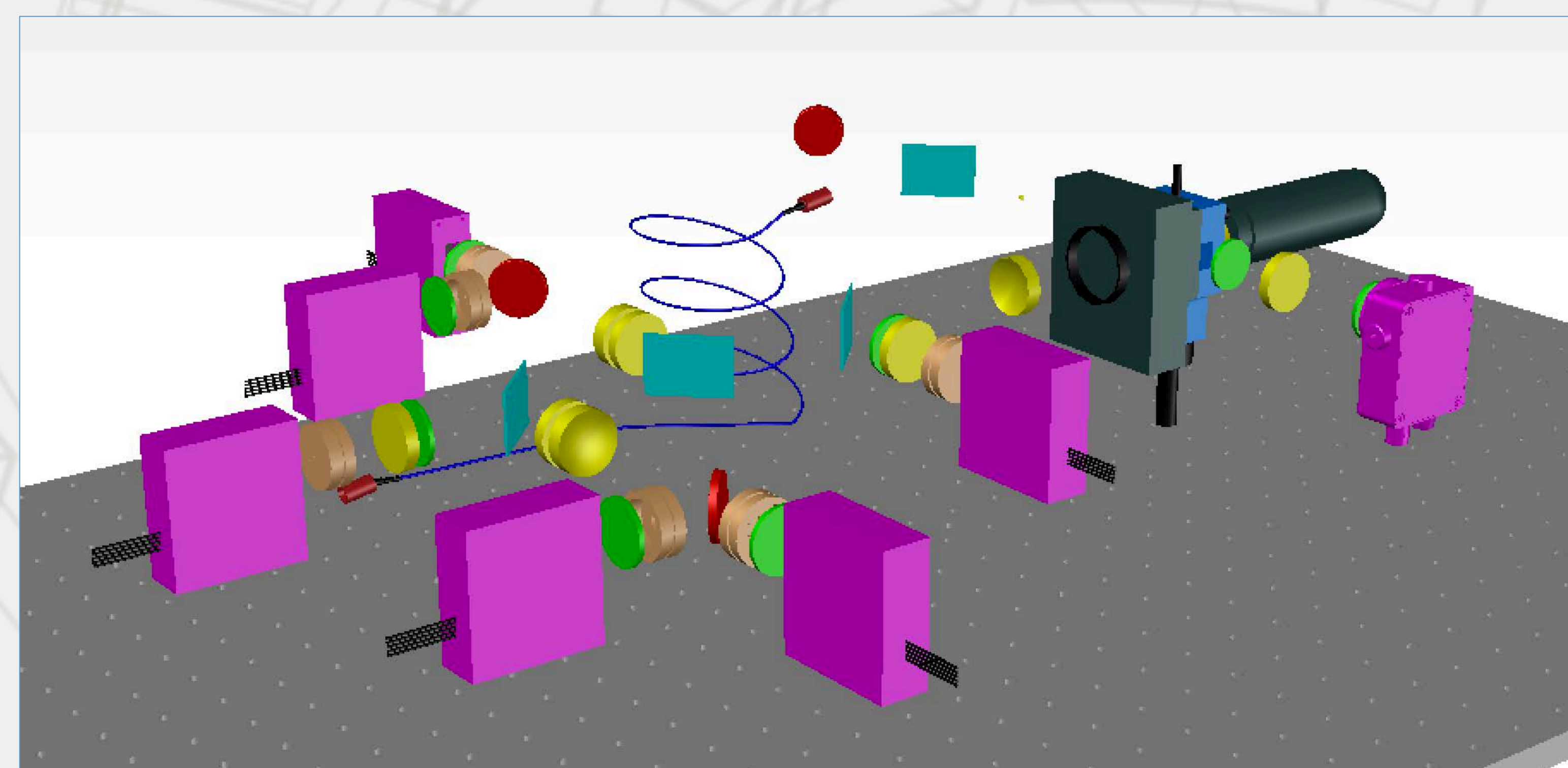
A Modular Platform for Flexible Flow Cytometry

G. Vacca¹, K.P. Shevgaonkar¹, N.V. Hawk², V. Kapoor², W. Telford²

¹Kinetic River Corp., Mountain View, Calif., USA; ²National Cancer Institute, Bethesda, Md., USA

BACKGROUND

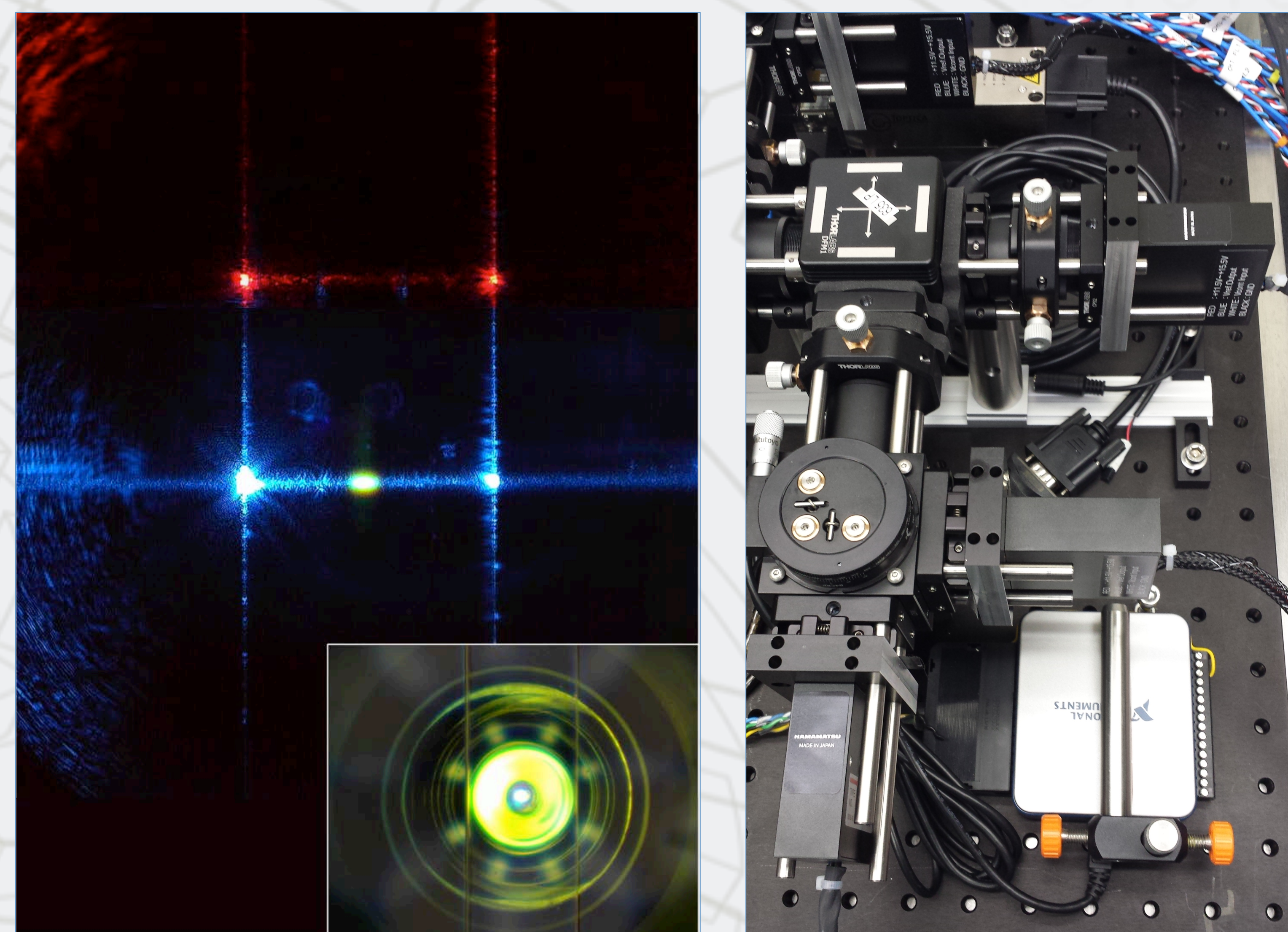
Efforts to push the envelope of flow cytometry instrumentation to develop novel and better assays are poorly served by commercial analyzers, which aim to be turnkey systems. The desire to standardize operation for the majority of users is counterproductive for those users who prefer, or need, flexibility in their instruments. Testing components newly introduced to the market (e.g., novel lasers and detectors) to gain a performance edge on difficult assays by modifying standard commercial systems ranges from impractical to next to impossible.



We have developed a new platform for flow cytometry, the *Potomac*, to serve the unmet need of an open and flexible architecture for cell analysis. This platform is the result of a complete from-the-ground-up design effort by Kinetic River Corp. to satisfy the requirements of the National Cancer Institute. The architecture can support up to 7 lasers and 20 detectors, and can be completely customized in terms of light sources, fluidics, filters, and detectors.

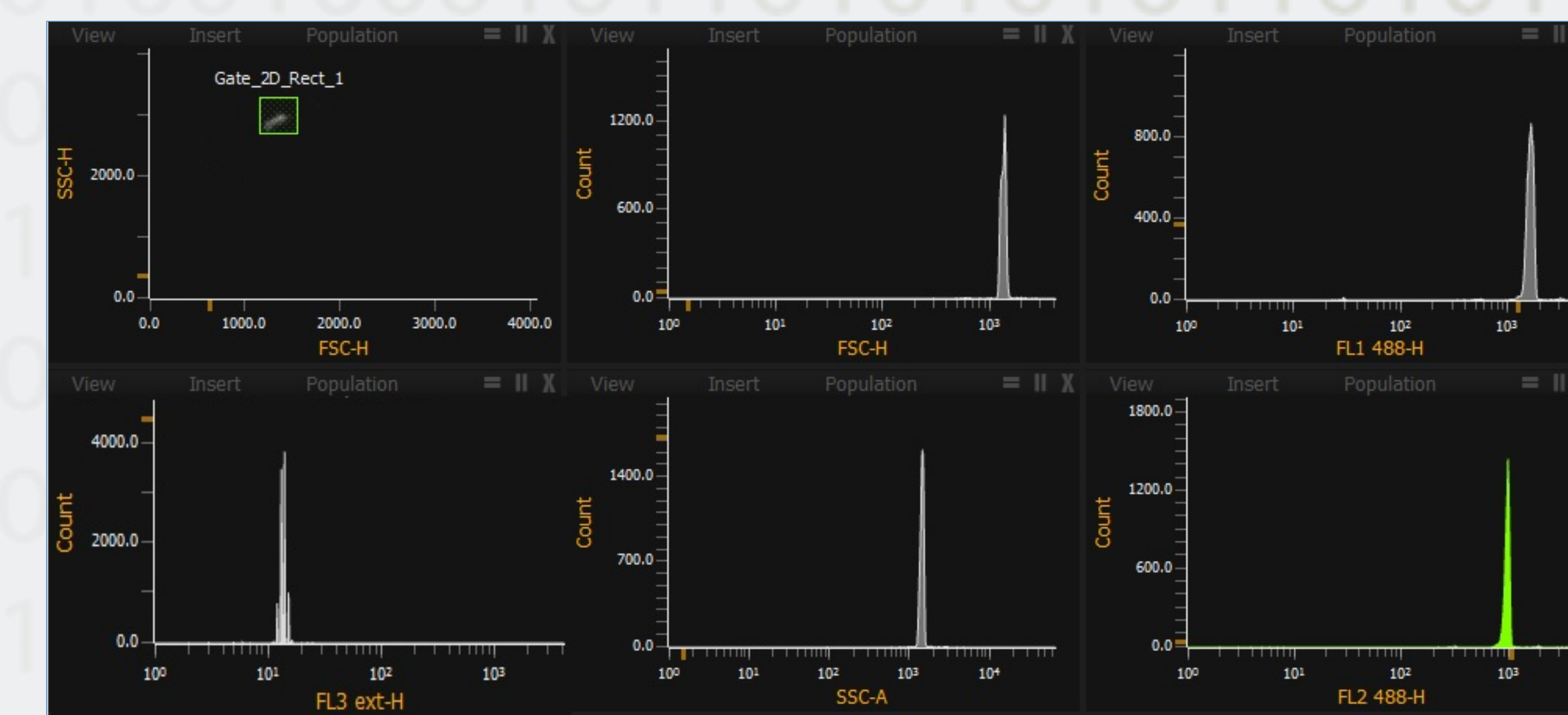
RESULTS

The custom system built under this project was designed to have two excitation sources: one internal and one external. The first, a Toptica 100-mW 488-nm solid-state, fiber-coupled laser, was built into the unit. A second laser beam is brought into the system from an external source; this design approach allows the second source to be whatever laser the user chooses.

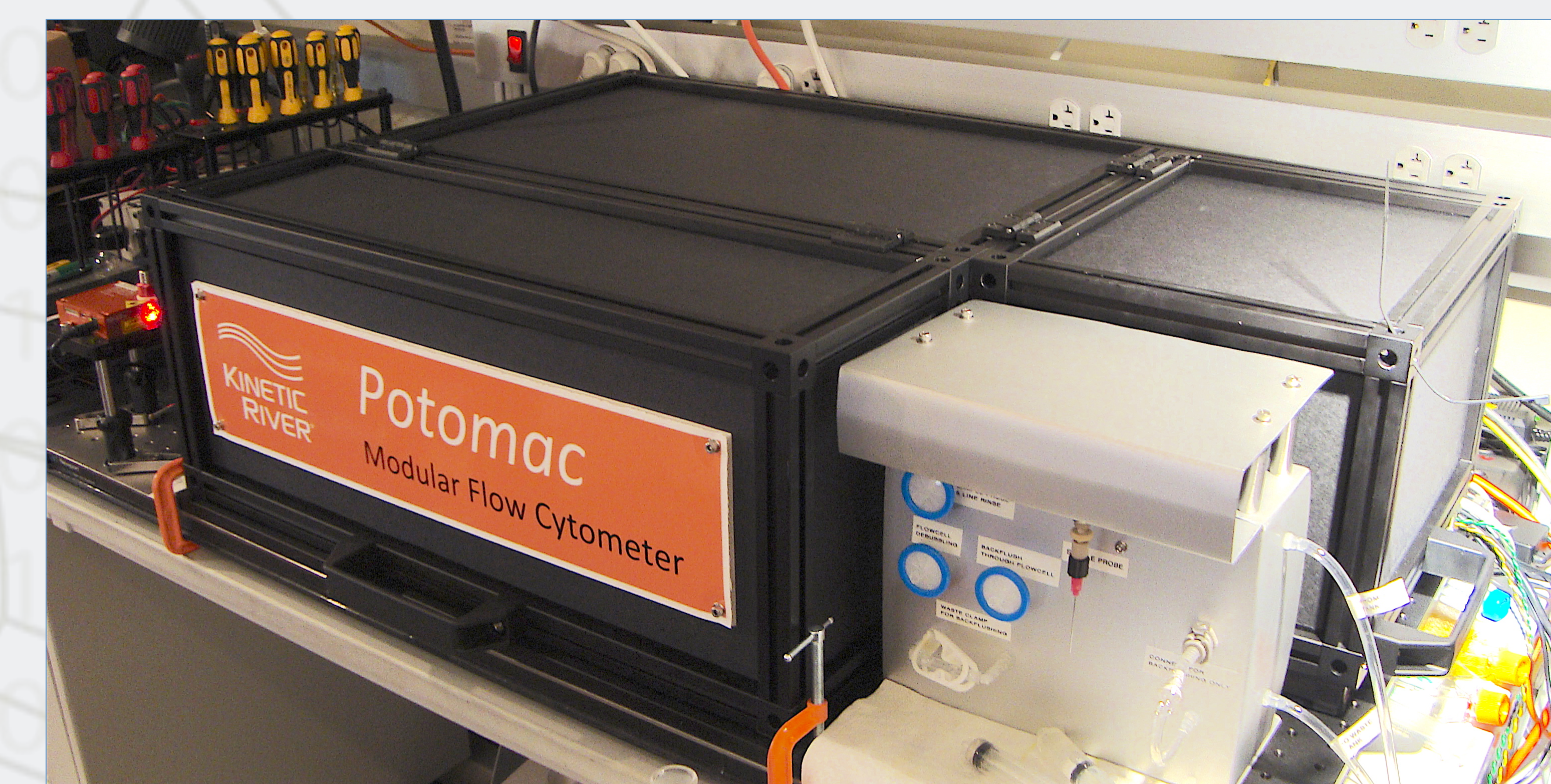


A rectangular flowcell with standard hydrodynamic focusing provides for interaction (using stacked beams) with the samples; sheath is delivered using a pressurized stainless steel vessel, while sample is aspirated and delivered with a precision syringe pump and a custom distribution valve. Both sheath pressure (up to 50 psig) and sample delivery rate (up to 300 μ L/min) can be set by the user to any desired values. Forward scatter at 488 nm is detected by a photodiode; a high-NA lens system collects fluorescence and side scatter. Alluxa dichroics and filters, all mounted in kinematic holders for maximum flexibility, separate side scattering (at 488 nm) and the five detection bands (two off 488 and three off the external source).

Copyright © 2017 Kinetic River Corp. All Rights Reserved.



Hamamatsu PMT modules (easily accessible and replaceable with other detectors, like SiPMs) convert the optical signals, and a DarklingX Azurite module with Kytos software coordinates data acquisition. The platform was built almost entirely with off-the-shelf Thorlabs optomechanical components. System testing with standard reference particles demonstrated the performance capabilities in the various channels of detection.



CONCLUSION

The *Potomac* flow cytometer provides users with a flexible, modular, and fully customizable cell-analysis platform. Direct accessibility to every system module and a rational, intuitive layout support the needs of researchers and developers looking to test new approaches to cell interrogation and analysis.

For further information:

Kinetic River Corp.

897 Independence Avenue #4A
Mountain View, CA 94043 USA

www.KineticRiver.com

info@KineticRiver.com

+1 (650) 269-0726