a flow cell. The method can include illuminating each of the set of calibration particles passing through the flow cell with at least two light beams wherein each light beam is associated with a channel. The method can include collecting light emitted from each of the set of calibration particles using a detector associated with each channel. The method can include recording data from each detector. The method can include setting a trigger channel to initiate a transfer of data from a first data collection time window associated with the trigger channel when a data signal threshold for the trigger channel is exceeded. The method can include setting a second channel to transfer data from a second data collection time window associated with the second channel when the data signal threshold for the trigger channel is exceeded, and wherein the start of the second data collection time window is based on a spatial path between the trigger channel and the second channel. The method can include recording data from the first data collection time window to a data store each time the data signal threshold is exceeded. The method can include recording data from the second data collection time window to the data store each time the data signal threshold for the trigger channel is exceeded. The method can include analyzing a distribution of data intensity peak times within the second data collection time window. The method can include calculating a time delay based on the distribution of data intensity peak times in the second data collection time window to modify the size and/or shift the second data collection time window.

The method can include the light emitted being fluorescent. The method can include the light emitted being scattered. The method can include the start of the second data collection time window is based on a flow rate. The method can include the start of the second data collection time window is based on a sheath fluid flow rate. The method can include the spatial path being between about 80 to 250 micrometers. The method can include the spatial path being about 150 micrometers. The method can include the data collection time windows being between about 80 to about 120 ADC points wide. The method can include the data collection time windows being between about 320 to about 360 ADC points wide.

[0009] In one aspect, a system to determine data processing settings for a flow cytometer is disclosed. The system can include a flow cell configured to flow calibration particles. The system can include at least two light sources each configured to emit a light beam, wherein each light beam is associated with a channel and, wherein the light beams pass through the flow cell. The system can include a detector associated with each channel wherein each detector can be configured to collect light emitted from each of the set of calibration beads. The system can include a memory buffer configured to record data from each of the

detectors. The system can include a trigger channel configured to initiate a transfer of data from a first data collection time window associated with the trigger channel when a data signal threshold for the trigger channel is exceeded. The system can include a second channel configured to transfer data from a second data collection time window associated with the second channel when the data signal threshold for the trigger channel is exceeded wherein the start of the second data collection time window is based on a spatial path between the trigger channel and second channel. The system can include a trigger processor configured to transfer the data from the first data collection time window to a data storage each time the data signal intensity threshold is exceeded and transfer the data from the second data collection time window to the data storage each time the data signal intensity threshold is exceeded. The system can include a computer processor configured analyze a distribution of data intensity peak times within the second data collection time window and calculate a time delay based on the distribution of data intensity peak times in the second data collection time window to modify the size and/or shift the second data collection time window.

The system can include a field programmable gate array wherein the memory buffer and the trigger processor are subcomponents of a field programmable gate array. The system can include the light emitted being fluorescent. The system can include the light emitted being scattered. The system can include the start of the second data collection time window being based on a flow rate. The system can include the start of the second data collection time window being based on a sheath fluid flow rate. The system can include the spatial path being between about 80 to 250 micrometers. The system can include the spatial path being about 150 micrometers. The system can include the data collection time windows being between about 80 to about 120 ADC points wide. The system can include the data collection time windows being between about 320 to about 360 ADC points wide.

In one aspect, a fluidic diagnostic method for a flow cytometer is disclosed. The method can include passing a set of calibration particles through a flow cell. The method can include illuminating each of the set of calibration particles passing through the flow cell with at least two light beams wherein each light beam is associated with a channel. The method can include collecting light emitted from each of the set of calibration particles using a detector associated with each channel. The method can include recording data from each of the detectors. The method can include setting a trigger channel to initiate a transfer of data from a first data collection time window associated with the trigger channel when a data signal threshold for the trigger channel is exceeded. The method can include setting a second channel to transfer data from a second data collection time window associated with the

second channel when the data signal threshold for the trigger channel is exceeded. The method can include recording data from the first data collection time window to a data store each time the data signal threshold is exceeded. The method can include recording data from the second data collection time window to the data store each time the data signal threshold for the trigger channel is exceeded. The method can include analyzing a distribution of data intensity peak times within the second data collection time window, identifying an area of the distribution meeting data quality requirements for a given experiment i.e. a system specification, and comparing it to the distribution as a whole to determine fluid pressure, mechanical perturbation in a pump, particle arrival time and laminar flow stability.

The method can include the system specification being 1 standard deviation. The method can include the system specification being 2 standard deviations. The method can include the system specification being 3 standard deviations. The method can include the system specification being 4 standard deviations. The method can include the system specification being a Gaussian distribution. The method can include the system specification being a Poisson distribution. The method can include the system specification being any statistical distribution. The method can include the light emitted being fluorescent. The method can include the light emitted being scattered. The method can include the data collection time windows being between about 80 to about 120 ADC points wide. The method can include the data collection time windows being between about 320 to about 360 ADC points wide.

[0010] In one aspect a fluidic diagnostic system for a flow cytometer is disclosed. The system can include a flow cell configured to flow calibration particles. The system can include at least two light sources each configured to emit a light beam, wherein each light beam is associated with a channel and, wherein the light beams pass through the flow cell. The system can include a detector associated with each channel wherein each detector is configured to collect light emitted from each of the set of calibration beads. The system can include a memory buffer configured to record data from each of the detectors. The system can include a trigger channel configured to initiate a transfer of data from a first data collection time window associated with the trigger channel when a data signal threshold for the trigger channel is exceeded. The system can include a second channel configured to transfer data from a second data collection time window associated with the second channel when the data signal threshold for the trigger channel is exceeded. The system can include a trigger processor configured to transfer the data from the first data collection time window to a data storage each time the data signal intensity threshold is exceeded and transfer the data from the second data collection time window to the data storage each time the data signal intensity threshold is exceeded. The system can include a computer processor configured to compare a distribution of data intensity peak times within the second data collection time

window to a system specification to determine fluid pressure, mechanical perturbation in a pump, particle arrival time and laminar flow stability.

The system can include a field programmable gate array wherein the memory buffer and the trigger processor can be subcomponents of the field programmable gate array. The system can include wherein the system specification being 1 standard deviation. The system can include the system specification being 2 standard deviations. The system can include the system specification being 3 standard deviations. The system can include the system specification being 4 standard deviations. The system can include the system specification being a Gaussian distribution. The system can include the system specification being a Poisson distribution. The system can include the system specification being any statistical distribution. The system can include the light emitted being fluorescent. The system can include the light emitted being scattered. The system can include the data collection time windows being between about 80 to about 120 ADC points wide. The system can include the data collection time windows being between about 320 to about 360 ADC points wide.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Fig. 1 is an illustration of one of various embodiments of a basic flow cytometer.
[0012] Fig. 2 is an illustration of one example of some of the types of data that can be collected by a flow cytometer.
[0013] Fig. 3 is an illustration of one example of some of the types of data that can be collected by a flow cytometer.
[0014] Figs. 4A an 4B illustrate wide and a narrow data time collection windows.
[0015] Fig. 5 is an illustration of one example of data coming from four channels in a flow cytometer.
[0016] Fig. 6 is an example embodiment of a method for determining data processing settings for a flow cytometer.
[0017] Fig. 7 is an illustration of one example of data from a flow cytometer where peak time spread increases as a function of distance from the trigger channel.
[0018] Fig. 8A illustrates peak times outside a system specification.
[0019] Fig. 8B illustrates peak times within a system specification.
[0020] Fig. 9A-E are illustrations of what flow cytometry data can look like when there is a fluidics failure.
[0021] Fig. 10 is an example embodiment of a method to diagnose a fluidics system for a flow cytometer.

6. The method in claim 1, wherein the spatial path is between about 80 to 250 micrometers.

7. The method in claim 1, wherein the spatial path is about 150 micrometers.

8. The method in claim 1, wherein the data collection time windows comprises 80 to 120 ADC points at intervals of either 500 nanoseconds or 1 microsecond .

9. The method in claim 1, wherein the data collection time windows comprises 320 to 360 ADC points at intervals of either 500 nanoseconds or 1 microsecond.

10. A system to determine data processing settings for a flow cytometer comprising:

a flow cell configured to flow calibration particles;

at least two light sources each configured to emit a light beam, wherein each light beam is associated with a channel and, wherein the light beams pass through the flow cell;

a detector associated with each channel wherein each detector is configured to collect light emitted from each of the set of calibration beads;

a memory buffer configured to record data from each of the detectors;

a trigger channel configured to initiate a transfer of data from a first data collection time window associated with the trigger channel when a data signal threshold for the trigger channel is exceeded;

a second channel configured to transfer data from a second data collection time window associated with the second channel when the data signal threshold for the trigger channel is exceeded wherein the start of the second data collection time window is based on a spatial path between the trigger channel and second channel;

a trigger processor configured to:

transfer the data from the first data collection time window to a data storage each time the data signal intensity threshold is exceeded; and

transfer the data from the second data collection time window to the data storage each time the data signal intensity threshold is exceeded;

a computer processor configured analyze a distribution of data intensity peak times within the second data collection time window and calculate a time delay based on the distribution of data intensity peak times in the second data collection time window to modify the size and/or shift the second data collection time window.