What is claimed is:

1. A method for determining photodetector gain for a plurality of photodetectors in a light detection system of a particle analyzer, the method comprising:

applying a reference voltage to each photodetector in the light detection system;

generating a reference data signal for each photodetector at the reference voltage;

irradiating with a light source the photodetectors at a plurality of different applied voltages;

generating for each photodetector an output data signal at each of the plurality of different applied voltages; and

calculating gain of the photodetectors at each of the plurality of different applied voltages based on the output data signals for each photodetector at each applied voltage and the reference data signal.

2. The method according to claim 1, wherein the method comprises applying the reference voltage in an amount sufficient to generate a reference data signal that is greater than photodetector noise from each photodetector by a predetermined separation index.

3. The method according to claim 2, wherein the method comprises incrementally increasing the applied reference voltage until the generated reference data signal is distinguishable from the photodetector noise for each photodetector.

4. The method according to any one of claims 1-3, wherein photodetectors are irradiated with the light source at a plurality of increasing applied voltages.

5. The method according to claim 4, wherein each increase in applied voltage is based on the two nearest voltages applied to the photodetector.

6. The method according to any one of claims 4-5, wherein the method further comprises determining that the generated output data signal of one or more of the photodetectors is saturated.

7. The method according to any one of claims 1-6, wherein the method comprises reducing intensity of the light source from a first intensity to a second intensity.

8. The method according to claim 7, wherein the method comprises:

irradiating the photodetectors with the light source at the second intensity; and

generating output data signals for each photodetector at a plurality of different applied voltages.

9. The method according to any one of claims 7-8, wherein the light source is reduced in intensity by 20-fold or more.

10. The method according to any one of claims 6-9, wherein the method comprises calculating a scaling factor for the generated output data signals of the photodetectors that are determined to be not saturated.

11. The method according to any one of claims 1-10, wherein the method comprises determining that the calculated gain for a photodetector changes monotonically between two or more of the different applied voltages.

12. The method according to any one of claims 1-11, wherein the method comprises generating output data signals for each photodetector at increasing voltages until one or more of:

all of the photodetectors in the light detection system are set to maximum voltage;

a maximum photodetector gain is determined for each photodetector;

baseline noise generated by a photodetector is greater than a predetermined threshold;

a minimal intensity of the light source can be applied to generate an output signal that is greater than the baseline noise of the photodetector; and

the calculated gain for a photodetector changes non-monotonically between two or more of the different applied voltages.

13. The method according to any one of claims 1-12, wherein the method comprises calculating a ratio of gain-to-voltage at the plurality of voltages for each photodetector in the light detection system.

14. A particle analyzer comprising:

a light source;

a light detection system positioned in a housing of the particle analyzer, the light detection system comprising a plurality of photodetectors; and

a processor comprising memory operably coupled to the processor wherein the memory comprises instructions stored thereon, which when executed by the processor, cause the processor to:

apply a reference voltage to each photodetector in the light detection system;

generate a reference data signal for each photodetector at the reference voltage;

irradiate with a light source the photodetectors at a plurality of different applied voltages;

generate for each photodetector an output data signal at each of the plurality of different applied voltages; and

calculate gain of the photodetectors at each of the plurality of different applied voltages based on the output data signals for each photodetector at each applied voltage and the reference data signal.

15. A non-transitory computer readable storage medium comprising instructions stored thereon for determining photodetector gain for a plurality of photodetectors in a light detection system of a particle analyzer the instructions comprising:

algorithm for applying a reference voltage to each photodetector in the light detection system;

algorithm for generating a reference data signal for each photodetector at the reference voltage;

algorithm for irradiating with a light source the photodetectors at a plurality of different applied voltages;

algorithm for generating for each photodetector an output data signal at each of the plurality of different applied voltages; and

algorithm for calculating gain of the photodetectors at each of the plurality of different applied voltages based on the output data signals for each photodetector at each applied voltage and the reference data signal.