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Abstract

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volutpat risus.

Author summary

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Text based on plos sample manuscript, see   1
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sodales ante, ut ullamcorper est egestas vitae. Nam sit amet enim ultrices, ultrices elit 8
pulvinar, volutpat risus.   9
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```
library(tidyverse)

file <- "nanosight_data.csv"


raw_data <- read_csv(file)
raw_data
```

```
## # A tibble: 1,000 x 37
##    particle_size mG15.5_yes_500_00 mG15.5_yes_500_01 mG15.5_yes_500_02
##            <dbl>             <int>             <int>             <int>
##  1         0.500                 0                 0                 0
##  2         1.50                  0                 0                 0
##  3         2.50                  0                 0                 0
##  4         3.50                  0                 0                 0
##  5         4.50                  0                 0                 0
##  6         5.50                  0                 0                 0
##  7         6.50                  0                 0                 0
##  8         7.50                  0                 0                 0
##  9         8.50                  0                 0                 0
## 10         9.50                  0                 0                 0
## # ... with 990 more rows, and 33 more variables: mG15.5_no_500_00 <int>,
## #   mG15.5_no_500_01 <int>, mG15.5_no_500_02 <int>, `400_yes_50_00` <int>,
## #   `400_yes_50_01` <int>, `400_yes_50_02` <int>, `400_no_50_00` <int>,
## #   `400_no_50_01` <int>, `400_no_50_02` <int>, `200_yes_125_00` <int>,
## #   `200_yes_125_01` <int>, `200_yes_125_02` <int>, `200_no_125_00` <int>,
## #   `200_no_125_01` <int>, `200_no_125_02` <int>,
## #   fluorx100_no_125_00 <int>, fluorx100_no_125_01 <int>,
## #   fluorx100_no_125_02 <int>, fluorx100_yes_125_00 <int>,
## #   fluorx100_yes_125_01 <int>, fluorx100_yes_125_02 <int>,
## #   fluor_no_125_00 <int>, fluor_no_125_01 <int>, fluor_no_125_02 <int>,
## #   fluor_yes_125_00 <int>, fluor_yes_125_01 <int>,
## #   fluor_yes_125_02 <int>, `100_no_125_00` <int>, `100_no_125_01` <int>,
## #   `100_no_125_02` <int>, `100_yes_125_00` <int>, `100_yes_125_01` <int>,
## #   `100_yes_125_02` <int>
```

```
raw_data %>%
  gather(ID,values,2:37)
```

```
## # A tibble: 36,000 x 3
##    particle_size ID                values
##            <dbl> <chr>              <int>
##  1         0.500 mG15.5_yes_500_00      0
##  2         1.50  mG15.5_yes_500_00      0
##  3         2.50  mG15.5_yes_500_00      0
##  4         3.50  mG15.5_yes_500_00      0
##  5         4.50  mG15.5_yes_500_00      0
##  6         5.50  mG15.5_yes_500_00      0
##  7         6.50  mG15.5_yes_500_00      0
##  8         7.50  mG15.5_yes_500_00      0
##  9         8.50  mG15.5_yes_500_00      0
## 10         9.50  mG15.5_yes_500_00      0
```

```
## # ... with 35,990 more rows                                          53
```

```r
raw_data %>%
  gather(ID,values,2:37) %>%
  separate(ID, into = c("sample", "filter", "dilution_factor","tech_rep"), sep =
```

```
## # A tibble: 36,000 x 6                                               54
##    particle_size sample filter dilution_factor tech_rep values        55
##            <dbl> <chr>  <chr>  <chr>           <chr>     <int>        56
## 1          0.500 mG15.5 yes    500             00            0        57
## 2          1.50  mG15.5 yes    500             00            0        58
## 3          2.50  mG15.5 yes    500             00            0        59
## 4          3.50  mG15.5 yes    500             00            0        60
## 5          4.50  mG15.5 yes    500             00            0        61
## 6          5.50  mG15.5 yes    500             00            0        62
## 7          6.50  mG15.5 yes    500             00            0        63
## 8          7.50  mG15.5 yes    500             00            0        64
## 9          8.50  mG15.5 yes    500             00            0        65
## 10         9.50  mG15.5 yes    500             00            0        66
## # ... with 35,990 more rows                                          67
```

```r
raw_data %>%
  gather(ID,values,2:37) %>%
  separate(ID, into = c("sample", "filter", "dilution_factor","tech_rep"), sep =
  mutate_at(vars(sample,filter,tech_rep),as.factor) %>%
  mutate_at(vars(dilution_factor),as.numeric)
```

```
## # A tibble: 36,000 x 6                                               68
##    particle_size sample filter dilution_factor tech_rep values        69
##            <dbl> <fct>  <fct>              <dbl> <fct>     <int>       70
## 1          0.500 mG15.5 yes                  500 00            0       71
## 2          1.50  mG15.5 yes                  500 00            0       72
## 3          2.50  mG15.5 yes                  500 00            0       73
## 4          3.50  mG15.5 yes                  500 00            0       74
## 5          4.50  mG15.5 yes                  500 00            0       75
## 6          5.50  mG15.5 yes                  500 00            0       76
## 7          6.50  mG15.5 yes                  500 00            0       77
## 8          7.50  mG15.5 yes                  500 00            0       78
## 9          8.50  mG15.5 yes                  500 00            0       79
## 10         9.50  mG15.5 yes                  500 00            0       80
## # ... with 35,990 more rows                                          81
```

```r
data <- raw_data %>%
  gather(ID,values,2:37) %>%
  separate(ID, into = c("sample", "filter", "dilution_factor","tech_rep"), sep =
  mutate_at(vars(sample,filter,tech_rep),as.factor) %>%
  mutate_at(vars(dilution_factor),as.numeric)
data
```

```
## # A tibble: 36,000 x 6                                               82
##    particle_size sample filter dilution_factor tech_rep values        83
##            <dbl> <fct>  <fct>              <dbl> <fct>     <int>       84
```

```
##  1        0.500  mG15.5 yes          500 00           0        85
##  2        1.50   mG15.5 yes          500 00           0        86
##  3        2.50   mG15.5 yes          500 00           0        87
##  4        3.50   mG15.5 yes          500 00           0        88
##  5        4.50   mG15.5 yes          500 00           0        89
##  6        5.50   mG15.5 yes          500 00           0        90
##  7        6.50   mG15.5 yes          500 00           0        91
##  8        7.50   mG15.5 yes          500 00           0        92
##  9        8.50   mG15.5 yes          500 00           0        93
## 10        9.50   mG15.5 yes          500 00           0        94
## # ... with 35,990 more rows                                    95
```

```r
data %>%
  count(sample)
```

```
## # A tibble: 6 x 2                                               96
##    sample        n                                              97
##    <fct>     <int>                                              98
## 1 100        6000                                               99
## 2 200        6000                                              100
## 3 400        6000                                              101
## 4 fluor      6000                                              102
## 5 fluorx100  6000                                              103
## 6 mG15.5     6000                                              104
```

```r
data %>%
  group_by(tech_rep) %>%
  count(sample)
```

```
## # A tibble: 18 x 3                                             105
## # Groups:   tech_rep [3]                                       106
##     tech_rep sample        n                                   107
##     <fct>    <fct>     <int>                                   108
##  1 00        100        2000                                   109
##  2 00        200        2000                                   110
##  3 00        400        2000                                   111
##  4 00        fluor      2000                                   112
##  5 00        fluorx100  2000                                   113
##  6 00        mG15.5     2000                                   114
##  7 01        100        2000                                   115
##  8 01        200        2000                                   116
##  9 01        400        2000                                   117
## 10 01        fluor      2000                                   118
## 11 01        fluorx100  2000                                   119
## 12 01        mG15.5     2000                                   120
## 13 02        100        2000                                   121
## 14 02        200        2000                                   122
## 15 02        400        2000                                   123
## 16 02        fluor      2000                                   124
## 17 02        fluorx100  2000                                   125
## 18 02        mG15.5     2000                                   126
```

```
data %>%
  group_by(tech_rep, filter) %>%
  count(sample)
```

```
## # A tibble: 36 x 4
## # Groups:   tech_rep, filter [6]
##      tech_rep filter sample        n
##      <fct>    <fct>  <fct>      <int>
##   1 00        no     100         1000
##   2 00        no     200         1000
##   3 00        no     400         1000
##   4 00        no     fluor       1000
##   5 00        no     fluorx100   1000
##   6 00        no     mG15.5      1000
##   7 00        yes    100         1000
##   8 00        yes    200         1000
##   9 00        yes    400         1000
## 10 00        yes    fluor       1000
## # ... with 26 more rows
```

```
data %>%
  filter(sample == "fluor")
```

```
## # A tibble: 6,000 x 6
##     particle_size sample filter dilution_factor tech_rep values
##             <dbl> <fct>  <fct>            <dbl> <fct>    <int>
##   1         0.500 fluor  no                 125 00           0
##   2         1.50  fluor  no                 125 00           0
##   3         2.50  fluor  no                 125 00           0
##   4         3.50  fluor  no                 125 00           0
##   5         4.50  fluor  no                 125 00           0
##   6         5.50  fluor  no                 125 00           0
##   7         6.50  fluor  no                 125 00           0
##   8         7.50  fluor  no                 125 00           0
##   9         8.50  fluor  no                 125 00           0
## 10         9.50  fluor  no                 125 00           0
## # ... with 5,990 more rows
```
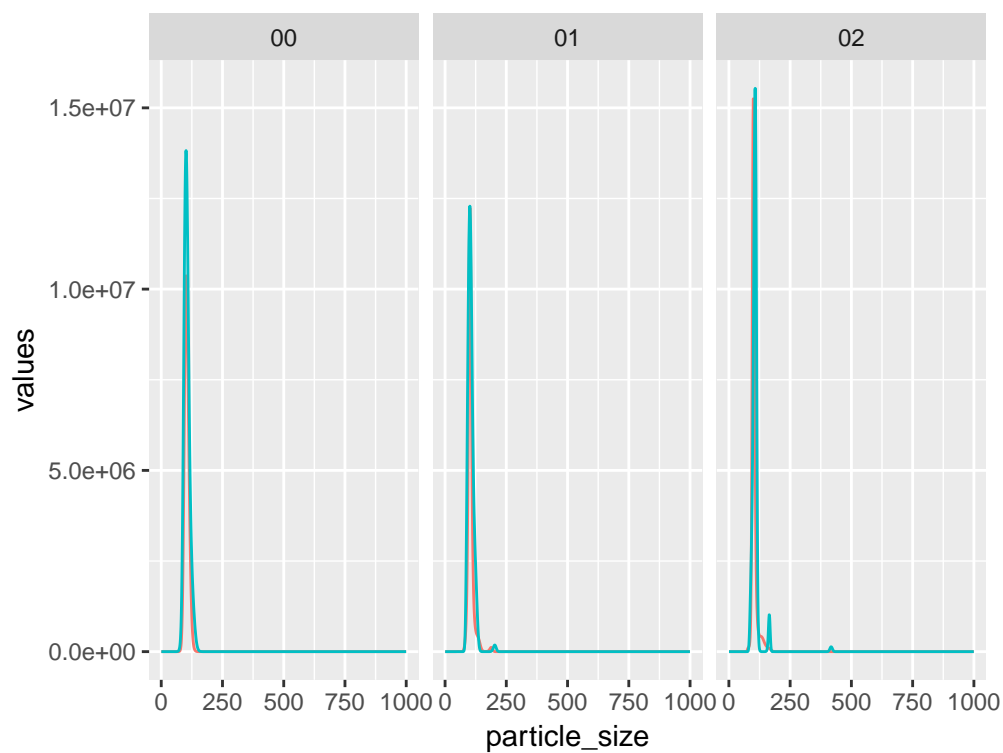
```
data %>%
  filter(sample == "fluor") %>%
  ggplot(aes( x = particle_size, y = values, color = filter))+
  geom_line()
```
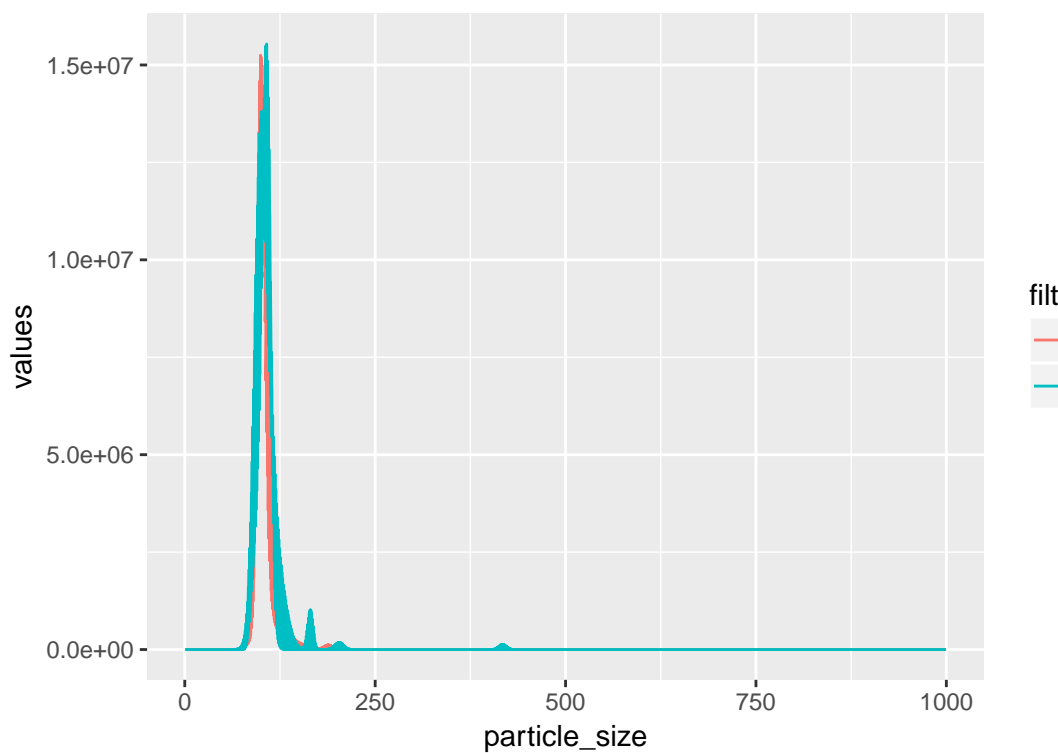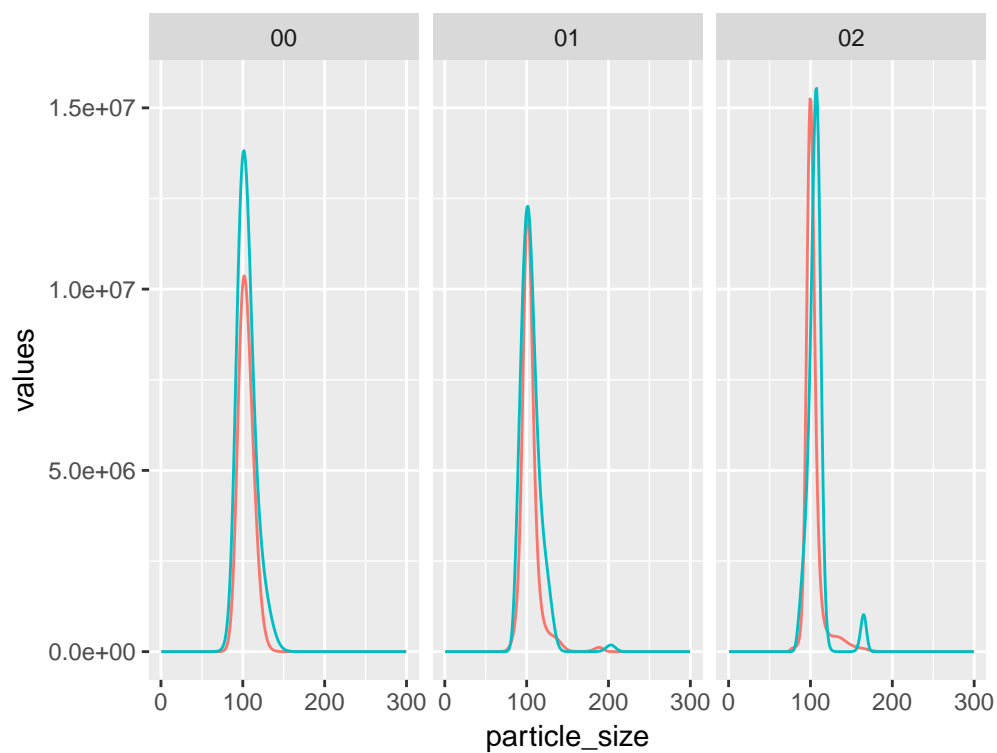
156

```
data %>%
  filter(sample == "fluor") %>%
  ggplot(aes( x = particle_size, y = values, color = filter))+
  geom_line() +
  facet_wrap(~tech_rep)
```
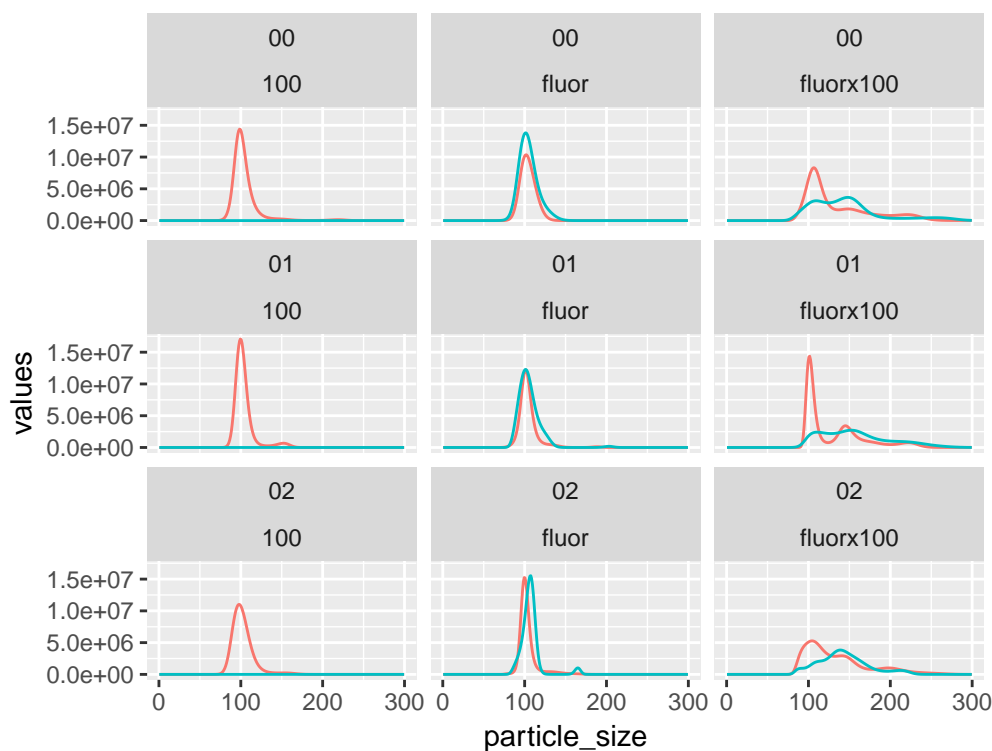
157

```
data %>%
  filter(sample == "fluor" &
         particle_size < 300) %>%
  ggplot(aes( x = particle_size, y = values, color = filter))+
  geom_line() +
  facet_wrap(~tech_rep)
```

```
data %>%
  filter(sample %in% c("100","fluor","fluorx100"),
         particle_size < 300) %>%
  ggplot(aes(x = particle_size , y = values, color = filter))+
  geom_line() +
  facet_wrap(tech_rep~sample)
```

Here are two sample references: [1,2].

References

1. Feynman R, Vernon Jr. F. The theory of a general quantum system interacting with a linear dissipative system. Annals of Physics. 1963;24: 118–173. doi:10.1016/0003-4916(63)90068-X

2. Dirac P. The lorentz transformation and absolute time. Physica. 1953;19: 888–896. doi:10.1016/S0031-8914(53)80099-6