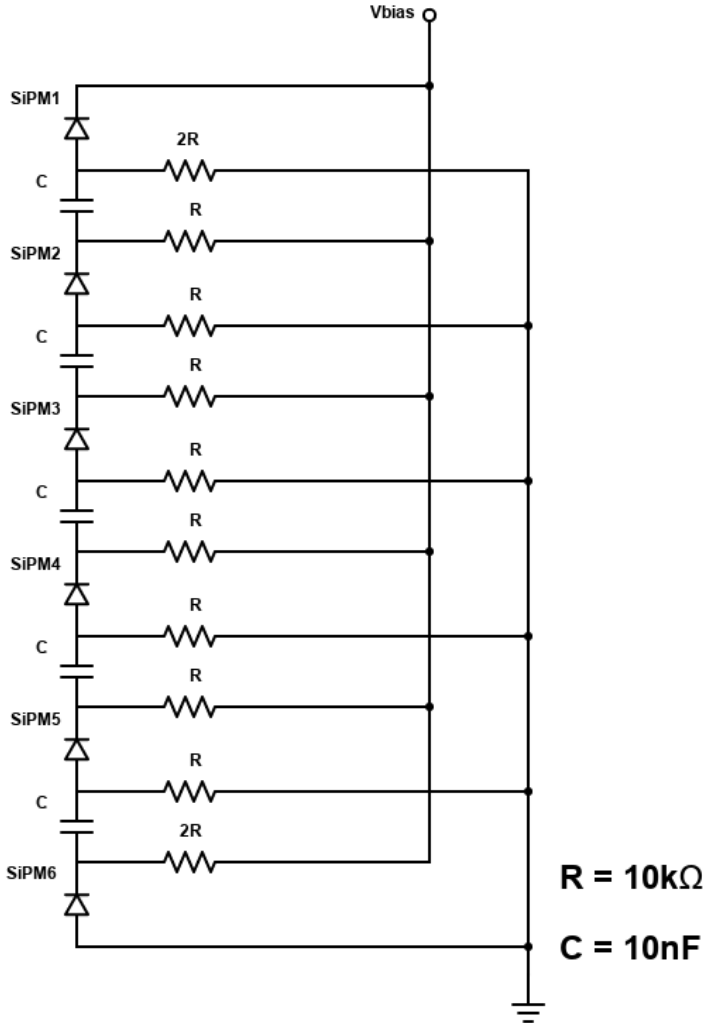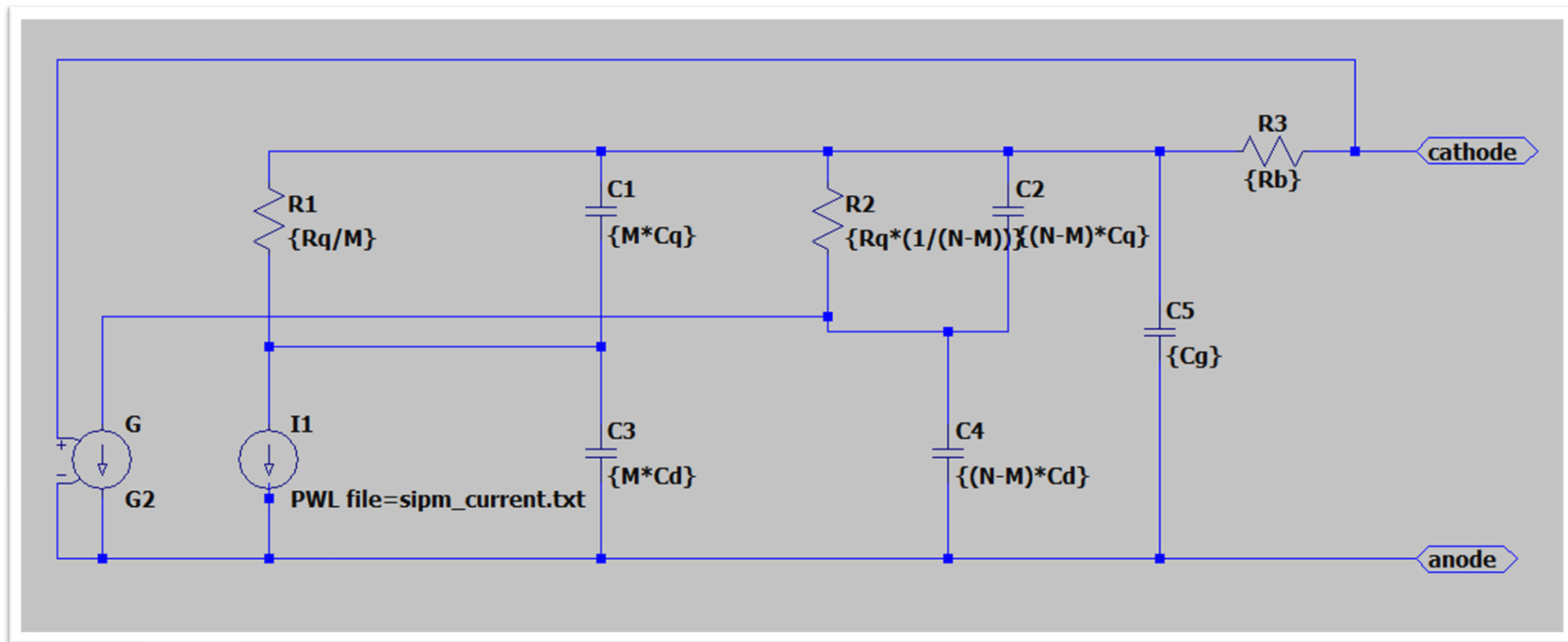# Series-Parallel SiPM bias Simulation

**ESTEBAN CRISTALDO**

March 24th, 2021

# Netlist of the simulation

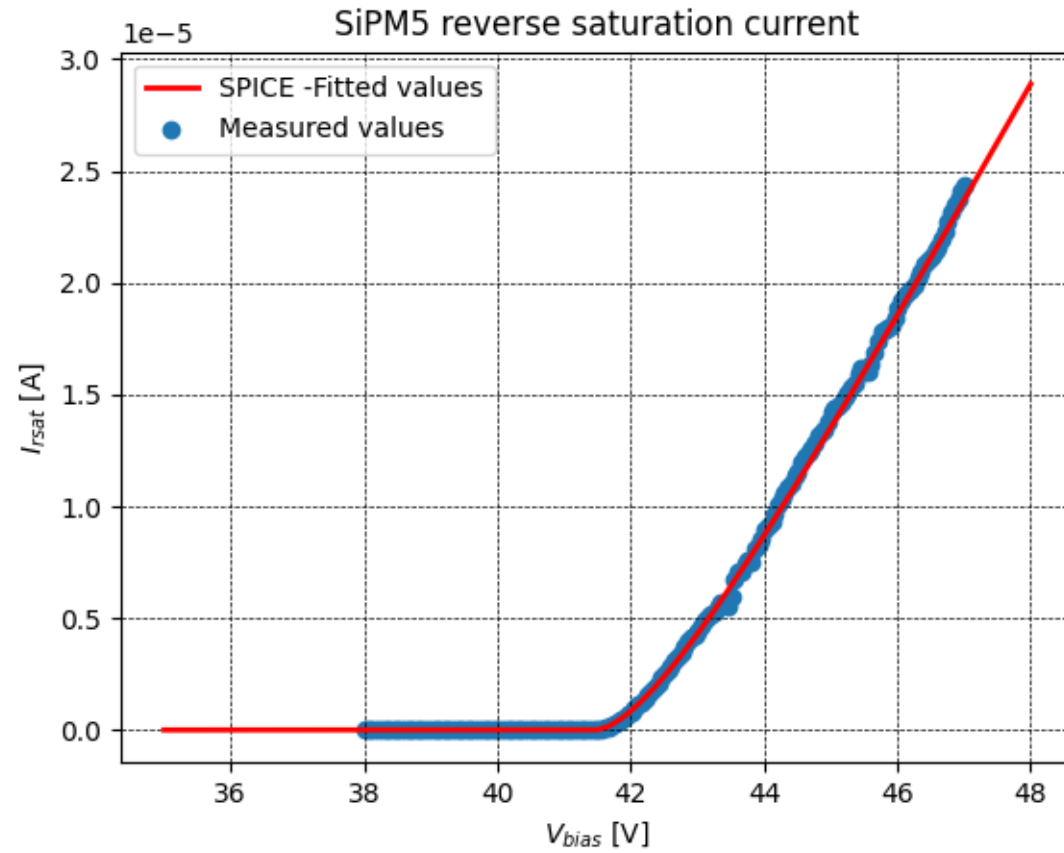# SiPM model

# SiPM model

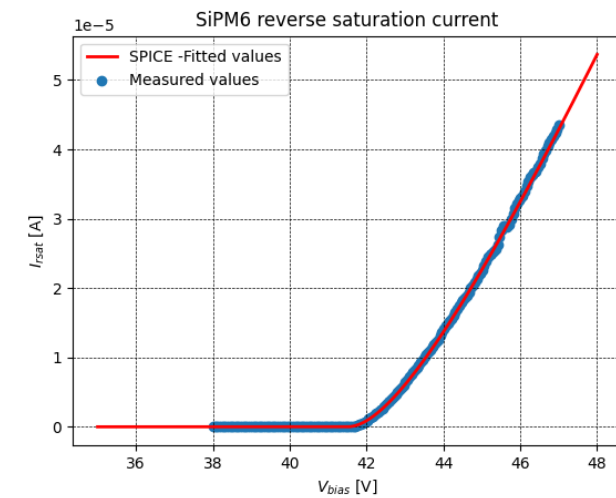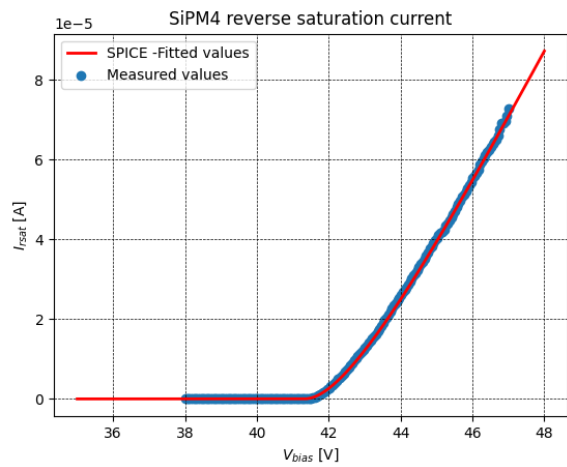| | Hamamatsu | | | | FBK | |
|---|---|---|---|---|---|---|
| | **LR-50** | **HR-50** | **LR-75** | **HR-75** | **CRYO** | **TripleT** |
| | ...-9932 | ...-9933 | ...-9934 | ...-9935 | (DS?) | |
| | | | | | | |
| | | | | | | |
| Cell size | 50 | 50 | 75 | 75 | 30 | 50 |
| Cell num | 14331 | 14331 | 6364 | 6364 | 37312 | 11188 |
| | | | | | | |
| Cap/cell | 8,9E-14 | 8,9E-14 | 2,0E-13 | 2,0E-13 | 5,36E-14 | 1,79E-13 |
| Res/cell | 1,00E+06 | 3,51E+06 | 5,00E+05 | 3,51E+06 | 3,36E+06 | 3,02E+06 |

# SiPM reverse saturation current

# SiPM reverse saturation current
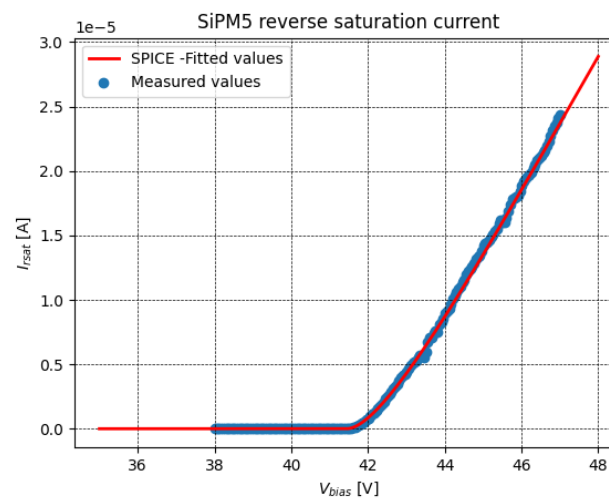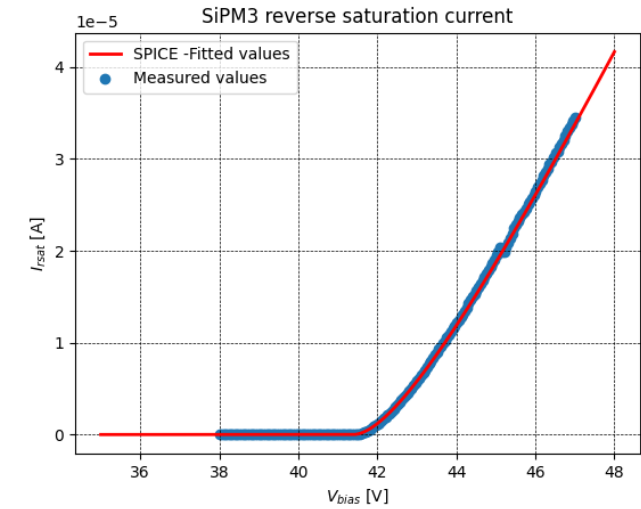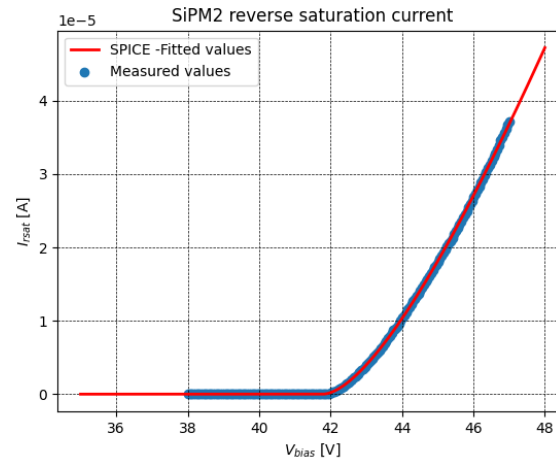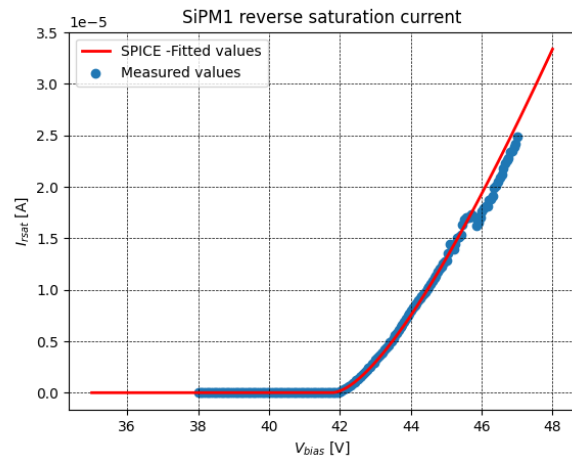
# Simulation using R = 10 kΩ

# Simulation using the same profile over differtent SiPMs



Voltage over the SiPM terminals - SPICE Simulation



Percentual voltage drop of $V_{bias}$ - SPICE Simulation
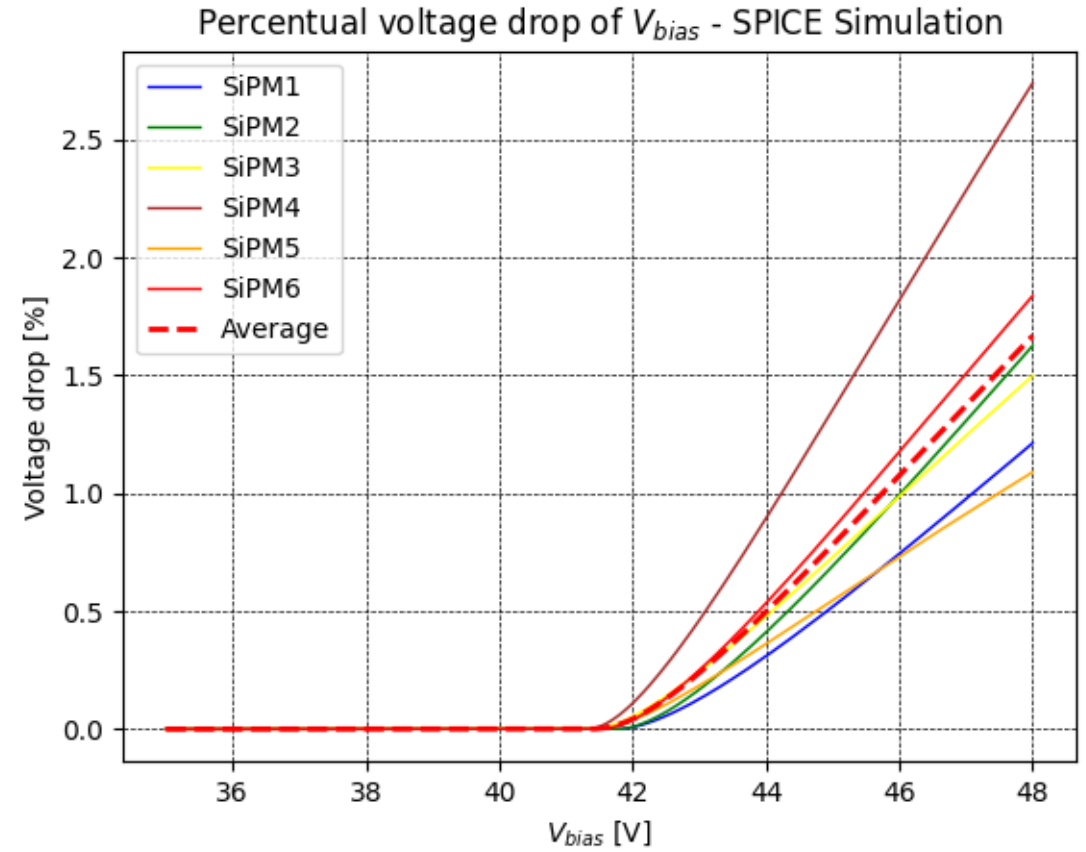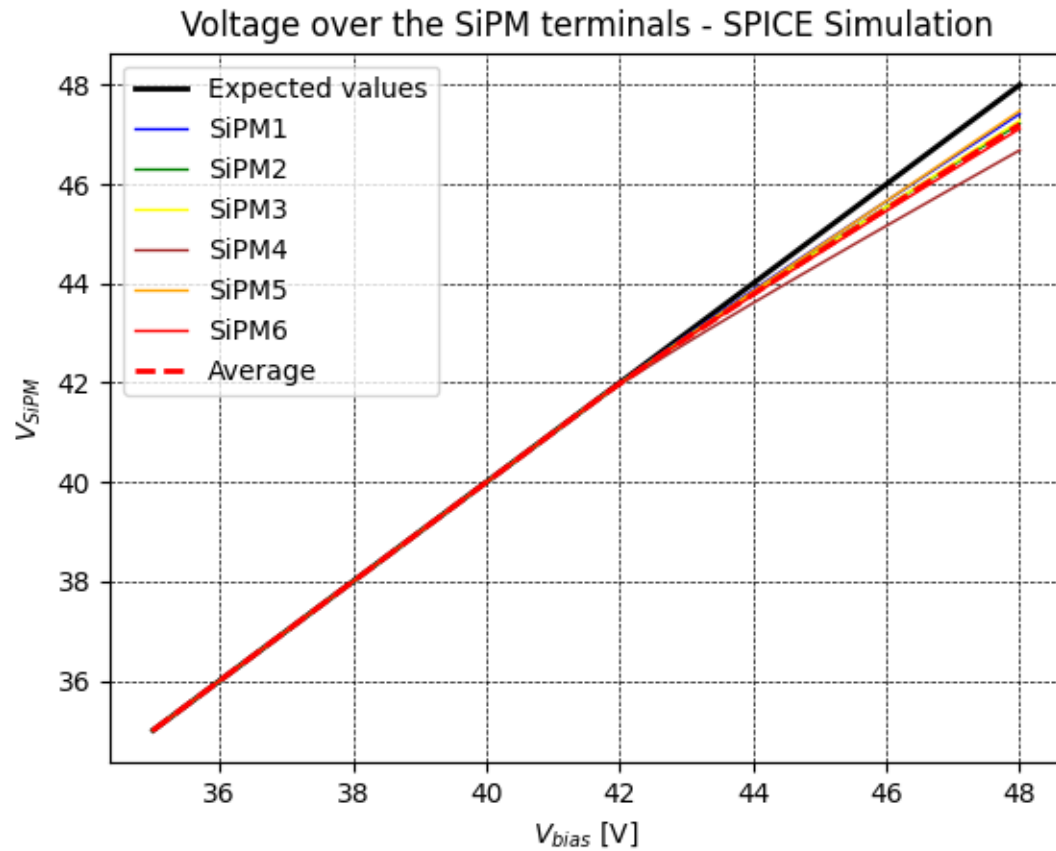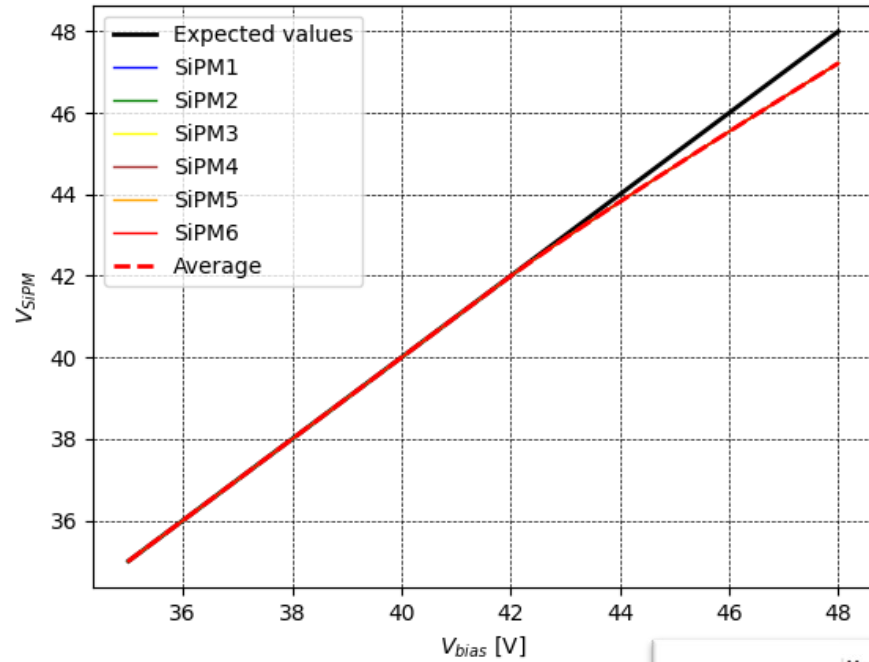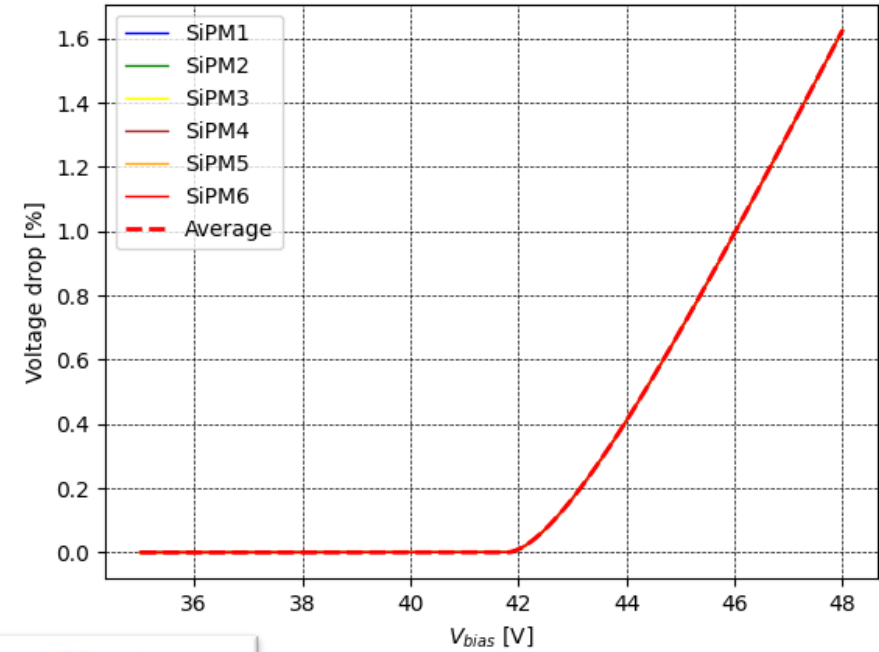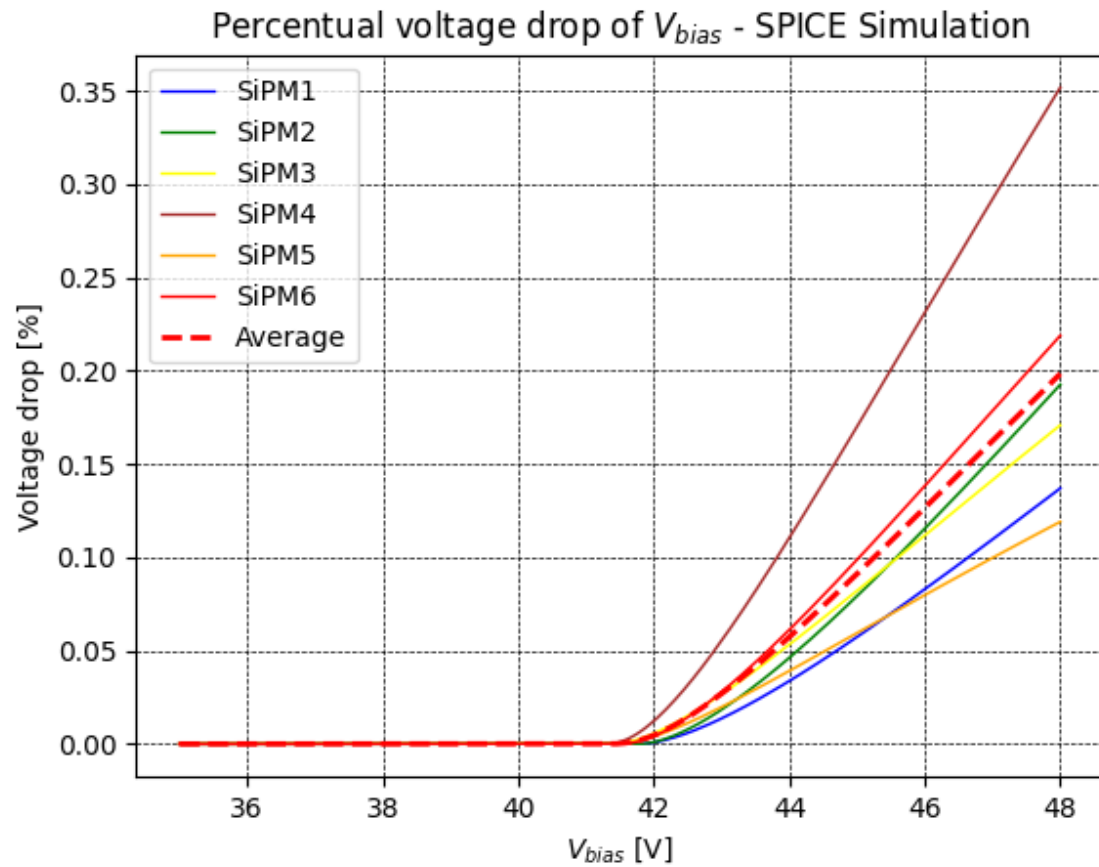
| | Hamamatsu | | | | FBK | |
|---|---|---|---|---|---|---|
| | LR-50 | HR-50 | LR-75 | HR-75 | CRYO | TripleT |
| | ...-9932 | ...-9933 | ...-9934 | ...-9935 | (DS?) | |
| Cell size | 50 | 50 | 75 | 75 | 30 | 50 |
| Cell num | 14331 | 14331 | 6364 | 6364 | 37312 | 11188 |
| Cap/cell | 8,9E-14 | 8,9E-14 | 2,0E-13 | 2,0E-13 | 5,36E-14 | 1,79E-13 |
| Res/cell | 1,00E+06 | 3,51E+06 | 5,00E+05 | 3,51E+06 | 3,36E+06 | 3,02E+06 |

# Simulation using R = 1 kΩ



Percentual voltage drop of $V_{bias}$ - SPICE Simulation

- Use the lowest value of R possible.
- The internal components of the SiPM contribution in the voltage drop is negligible.