HRPPD ageing studies – Assumptions for INFN studies 1/3

➢ Reference integrated photon fluence

- ➢ **Assuming Andrew's simulation as reference**
- ➢ **Scaling to 10 y**
- ➢ **Ignoring the limited hottest areas**
  - ➢ 3-4 HRPPDs will experience the highest fluence

→ **reference integrated fluence: 10^{14}**

→ **obtain the total fluence in 3-4 steps**

→ **IMPORTANT: to obtain 10^{14} in 10 day implies 10^{13}/d**

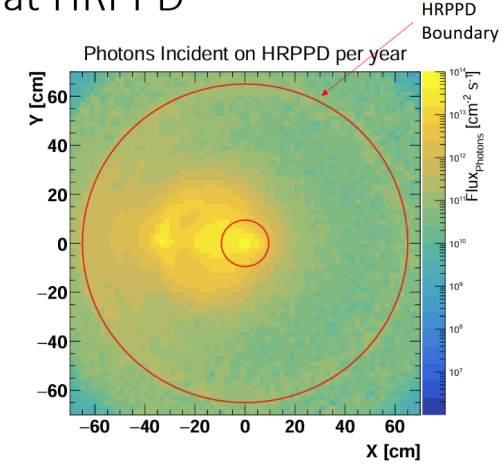
we will use continuous illumination at 405 nm

From the saturation curves, max integrated fluence per day w/o saturation at a gain of 10^6 is ~ 2 x 10^{11} → **forget MCP_exit and keep it off during intense illumination**

→ **According to the results for 10^{14}, an exploration to 10^{15} can be attempted**

Total Flux of photons at HRPPD

- Scale total per second flux by 26 weeks in seconds
- Add together both contributions, and scale to 100 photons/particle at window at 10 photons/particle at aerogel
- Assuming all photons travel straight ahead (naïve assumption for now)
- Total photons incident on HRPPD in one year of running



Radiation Hardness
Photon Flux/Charge Studies

Andrew Tamis (Yale University)
3/19/25

HRPPD ageing studies – Assumptions for INFN studies 2/3

- **Gain and HV setting**
  - **Voltage at PC: fixed at 200 V**
  - **Integrating the light fluence MCP_exit kept off**
  - **Proposal: let's study 3-4 values of MCP_Entrance HV :**
    - **Range of MCP_Entrance gain : 0.5 x 10^3 – 5 x 10^3**
    - **Scaling to intermediate gains is certainly possible**

HRPPD ageing studies – Assumptions for INFN studies 3/3

- **Measurement strategy**

  - **Light flux rate, proposal:**

  1. **reaching the integrated flux in 10 d**
  2. **3-4 intermediate pauses to check the performance + a final check**
     - **Checking performance require a pause time between intense light application and measurements: 1 d**
     - **Use always the same HV setting for the performance checks**
     - **HV optimized to better see the deterioration effects , if any**
       - **f.i., large gain (~ 10^7) to check PDE variation and gain variation**

  - **In the above hypothesis an ageing study takes 14 d**
  - **A slower rate exercise for comparison (if possible: calendar constrains)**
  - **Do ageing exercises at 3-4 HV values of MCP_Entrance**