

Photons and Electrons

Jim Miller

Photons and Electrons

- Radiative Muon Decay (RMD)
 - Up to the conversion electron endpoint
- Radiative Muon Capture (RMC)
 - Up to nearly the conversion point
- Decay in Orbit Electrons (DIO)
 - Up to the endpoint
- Delayed gammas from nuclear activation

Radiative Muon Capture

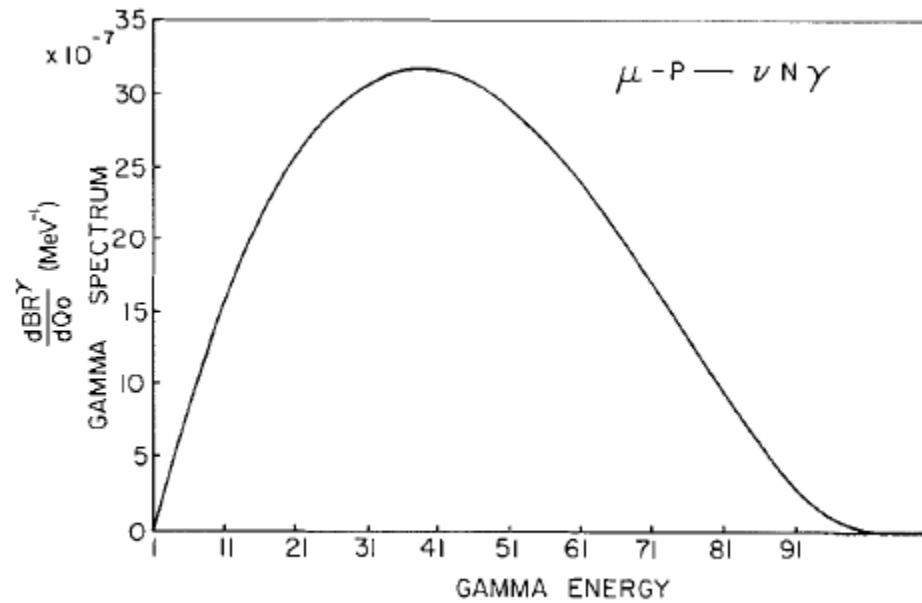
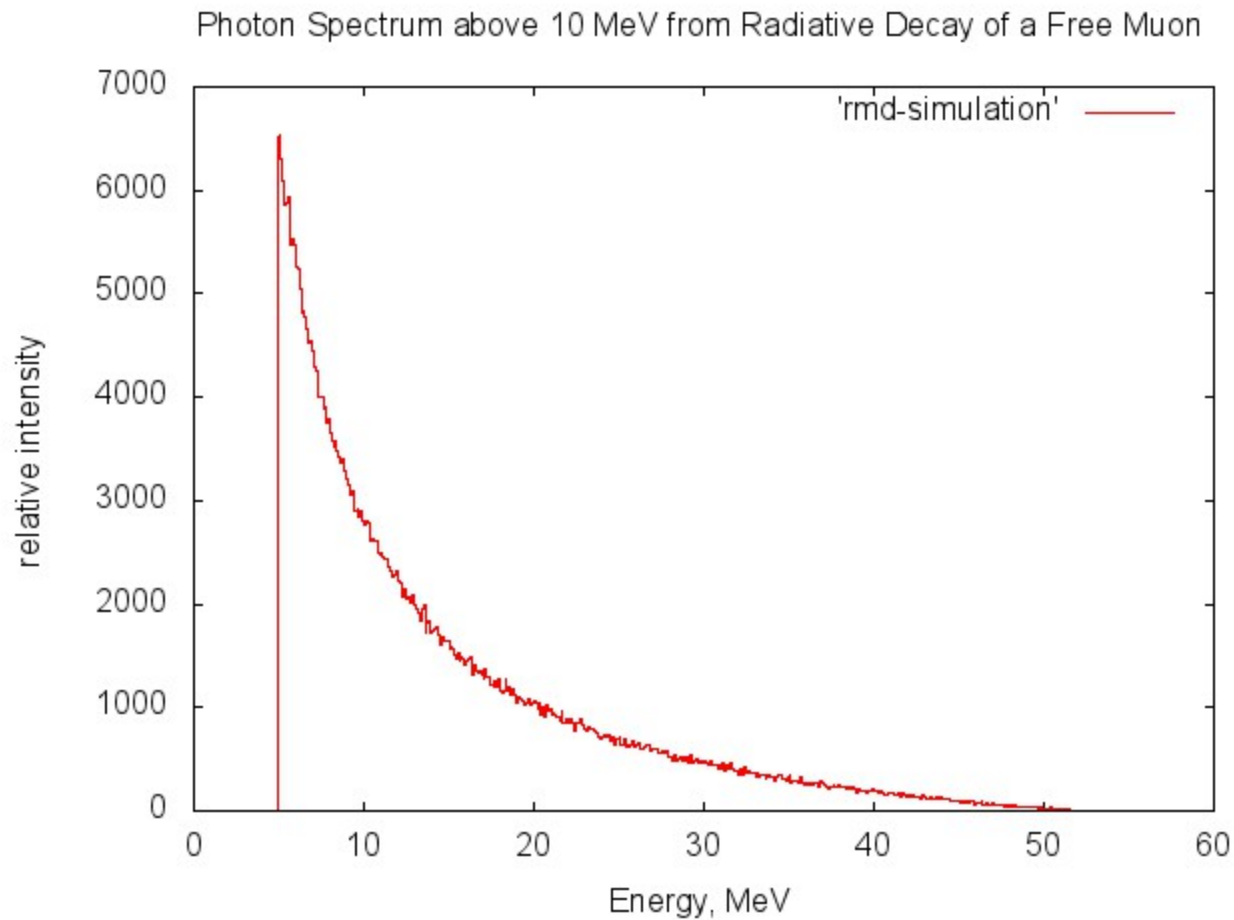


FIG. 3. Photon spectrum for $\mu^- p \rightarrow \nu N \gamma$.

Radiative Muon Decay

Some modification at high energy required for bound muon.

Look at 30 MeV and above where backgrounds are relatively low?



Electrons from Muon Decay-in-Orbit

- Check normalization of DIO's above 53 MeV
 - Czarnecki, et al.
- Evaluate suitability for normalization
- We will never see much above ~ 90 MeV- need COMET or Mu2e for that
- Use scintillator paddles to ID electrons

DIO Electrons

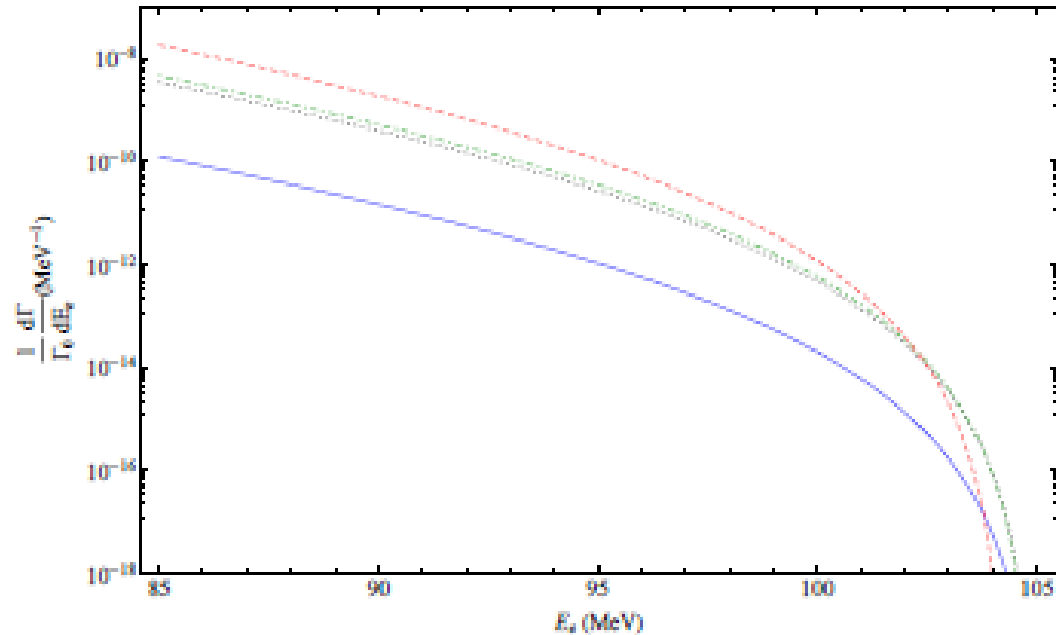


Fig. 1 Electron spectrum, normalized to the free-neutron decay rate Γ_0 . The solid blue line is for carbon, the black dotted line for aluminum, the green dot-dashed line for silicon and the red dashed line for titanium.

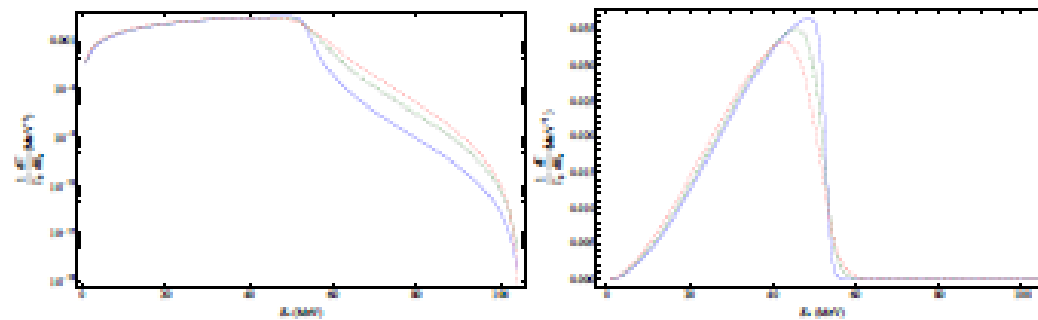


Fig. 2 Electron spectrum for the full range of E_e ; see caption of Fig. 1.

- From stefanomiscetti@gmail.com Mon Mar 24 03:58:08 2014
 - Date: Mon, 24 Mar 2014 08:58:02 +0100
 - From: miscetti <stefanomiscetti@gmail.com>
 - To: James Miller <miller@buphy.bu.edu>
 - Cc: Stefano Miscetti <Stefano.Miscetti@Inf.infn.it>
 - Subject: Re: LYSO array
-
- Dear Jim,
 - We are really eager to participate to this measurement and, if we know in time the period,
 - we will surely organize an expedition and ask money to INFN to participate. You should let
 - me know it before July in order to ask money for 2015 traveling.

- My questions are:
- ++++++
- --> What kind of spectrum? From 30 MeV up to ?
- --> What kind of rate?
- --> at What angle of incidence?
- --> Do you have a finger scintillator for triggering electrons or a position device in front ?
- We do have also a small fiber tracker but it depends on the beam spot.

- For our LYSO array:
- --> 25 crystals "square"-faces, of dimension 30x30x130 mm**3.
- --> Readout with 1 hamamatsu APD 10x10 mm**2
- --> FEE (Voltage Amplifier G-300).
- --> HV DC-DC converter with linear and local regulator from 250 to 500 V.
- Current enough to sustain a rate of 50 kHz/channel, 100 MeV.
- --> Typically readout with a VME based program and 4 boards of CAEN digitizer
- a 250 Msps, 12 bit resolution. We can trigger on external trigger or on the
- calorimeter itself if needed via an analogue sum (in case of photons).
- --> Signals are single ended at 50 Ohm. If you have a more general DAQ
- you want to use (typically the Ritter 2Gs fast digitizer), we need to know
- only if you need differential signals to modify the output.

- Regards,
- Stefano
- Does this come w/electronics?