TEEGG GUIDE (Version 7.1)

The Monte Carlo event generator, TEEGG, simulates the process $e^+e^- \to e^+e^-\gamma(\gamma)$, for low Q^2 configurations. This guide describes the many parameters of TEEGG.

Reference: D. Karlen, *Nucl. Phys.* **B289** (1987) 23.

1. General Parameters

`EB` the beam energy in GeV.

`CONFIG` the event configuration to be generated.

This specifies what particles are to be in the detector acceptance, the remaining are to be below the veto angle. The allowed choices are:

EGAMMA $e\gamma$

GAMMA single γ

ETRON single e

RADCOR the level of radiative correction to be applied. Valid choices are:

NONE no radiative correction is applied; only order α^3.

SOFT virtual and soft real photon correction to the order α^3 cross section is applied.

HARD double radiative Bhabha events are generated.

In order to generate an event sample correct to order α^4, *SOFT* and *HARD* event samples must be generated separately and then combined.

CUTOFF defines the separation between soft and hard photons in the γe center of mass system (in GeV). This is used with `RADCOR` = *SOFT* or *HARD*. An invalid choice for this quantity will be noted in the printed summary.

UNWGHT specifies if unweighted events are to be generated. If `UNWGHT` = `.FALSE.`, then the event weight is given the variable `WGHT`.

2. Acceptance Parameters

The following parameters determine the acceptance for the $ee\gamma$ final state:

`EEMIN`	($E_{e\,\mathrm{min}}$)	Electron acceptance energy threshold (GeV)
`TEMIN`	($\theta_{e\,\mathrm{min}}$)	Electron acceptance angle (rad)
`EGMIN`	($E_{\gamma\,\mathrm{min}}$)	Photon acceptance energy threshold (GeV)
`TGMIN`	($\theta_{\gamma\,\mathrm{min}}$)	Photon acceptance angle (rad)
`TEVETO`	($\theta_{e\,\mathrm{veto}}$)	Electron veto angle (rad)
`TGVETO`	($\theta_{\gamma\,\mathrm{veto}}$)	Photon veto angle (rad)

The set of parameters required to define the acceptance depends on the event configuration. For a configuration where an electron is to be in the acceptance, `TEMIN` and `EEMIN` must be supplied and similarly if a photon is to be in the acceptance, `TGMIN` and `EGMIN` must be supplied. For the single e configuration, the parameter `TGVETO` is used to define the photon veto. `TEVETO` is always used, as one electron is below this veto angle for all configurations (for the single γ configuration, both electrons are below this angle).

Additional parameters to define the acceptance for the $ee\gamma\gamma$ final state are:

PEGMIN	($\phi_{e\gamma\,\mathrm{min}}$)	Electron photon ϕ separation threshold for $e\gamma$ config. (rad)
EEVETO	($E_{e\,\mathrm{veto}}$)	Electron veto energy threshold (GeV)
EGVETO	($E_{\gamma\,\mathrm{veto}}$)	Photon veto energy threshold (GeV)
PHVETO	($\phi_{\ \mathrm{veto}}$)	veto ϕ separation threshold (rad)

These parameters should not need to be changed from the default values. An $e\gamma$ trial event is accepted only if an e and γ are in the acceptance, and separated in ϕ by at least PEGMIN rad. A single e trial event is rejected if a γ is above TGVETO with energy greater than EGVETO and separated from the e in ϕ by more than PHVETO. A single γ trial event is rejected if an e is above TEVETO with energy greater than EEVETO. It is also rejected if a second γ is above TGVETO with energy greater than EGVETO and separated from the first γ in ϕ by more than PHVETO.

3. Maximum Weights

The program does not choose the maximum event weights, and so they must be set by the user. The maximum weights should be chosen to be as small as possible.

WGHT1M	used in the rejection method for the first degree of freedom, q_+^0.
WGHTMX	used in the trial event selection only if unweighted events are requested. If this is not larger than all weights of accepted events, then the event distribution will not be correct. A proper choice for this parameter can vary from 0.1 to 10 or more.

4. Other Parameters

Two remaining parameters specify the squared matrix elements to use.

MATRIX defines the matrix element for the $e^+e^- \to e^+e^-\gamma$ generation.

BK	Berends and Kleiss, *Nucl. Phys.* **B228** (1983) 537.
BKM2	as above but includes t and t' channel mass terms.
TCHAN	as calculated by using only the two t channel diagrams.
EPA	as derived from the equivalent photon approximation.

MTRXGG defines the matrix element for the $e^+e^- \to e^+e^-\gamma\gamma$ generation.

EPADC	as found from the EPA and double compton scattering.
BEEGG	Berends *et. al.*, *Nucl. Phys.* **B264** (1986) 265.
MEEGG	Martinez and Miquel, UAB-LFAE 87-01.
HEEGG	Hybrid; *EPADC* for very low Q^2, *BEEGG* for moderate Q^2.

5. Defaults

The defaults for the parameters described above are listed here.

EB =14.5 GeV	EEMIN =2.0 GeV	PEGMIN =$\pi/4$ rad	WGHT1M =1.001
CONFIG =*EGAMMA*	TEMIN =0.72 rad	EEVETO =0.0 GeV	WGHTMX =0.5
RADCOR =*NONE*	EGMIN =2.0 GeV	EGVETO =0.0 GeV	MATRIX =*BKM2*
CUTOFF =0.25 GeV	TGMIN =0.72 rad	PHVETO =$\pi/4$ rad	MTRXGG =*EPADC*
UNWGHT =.TRUE.	TEVETO =0.1 rad		
	TGVETO =0.05 rad		