Access to the parameter database of the β-beam using *Mathematica*

The database is accessible via a <u>web-interface</u> [1] for reading purpose. Also it is possible to get the parameter values directly in *Mathematica* session for further calculations. This guide describes the use of this feature.

1) Download the <u>dbaccess.ZIP</u> [2] archive from the beta-beam task <u>web-page</u> [3] and extract the following three files into a local directory: access_db.m, sample.nb and BBParametersBrowser.nb.
2) Start a *Mathematica* session and open sample.nb
   - Change the argument of **SetDirectory["c:\\temp"],** if it is necessary.
   - Run the first input cell "Loading the packages".
     The package WebServices is loaded and the function **GetPV[]** is defined.
     GetPV[id_String, par_String] retrieves one parameter value from the database.
     → **id** stands for the object identifier e.g. the *ion* like "6He", the *machine* like "SPS" or even a combination of the two like "SPS-6He" (the *beam*);
     → **par** is the identifier of the parameter to be picked e.g. "ion_thalf" for the ion half life or "machine_R" for the physical radius of a machine.
     The returned parameter value can be a number or a string. Some values are returned as strings while being the special characters e.g. ∞ for the proton "ion_thalf".
3) Run the sample cell "example of picking the value ..."
   - The half life-time at rest of the 6He isotope is 0.81 s.

BBParametersBrowser.nb is a palette which allows to you to input the identifiers of the objects and parameters choosing their secular names from a menu:
1) Open the file BBParametersBrowser.nb.
2) Click on the button **GetPV[■, □]** in the top of the palette. This inserts the function template into the active notebook. The placeholder for id_String is automatically selected.
3) Below on the palette window the parameter menu is shown with a structure similar to the web-based interface. Each object group (e.g. "machine") contains two parts, one with the choices for the object **id** indicated with blue background (in rows) and the other part providing the list of parameters indicated with rose background (in column). Parameters are also grouped by categories.
4) After having inserted the **GetPV** template, click for example the blue button "SPS", which inserts the string **"SPS"** as the first function argument. Click a rose button for a parameter e.g. "Circumference". This inserts the string **"machine_circumference"** as the second argument.
5) Run the modified cell. The value of the circumference of the SPS of 6911.5 is displayed.
6) A more demanding request for the "ion intensity per cycle at PS ejection for 18Ne": insert the **GetPV** template, open the menu item "beam", click the blue button "PS-18Ne". Open the submenu "intensity ejection" and click the rose button "Ions/cycle". Run the cell and expect the result to be $4.31377*10^{12}$.

Integrate the new feature to any of your mathematica applications.
N. Emelianenko, <u>A. Fabich</u>, March 2006
[1] <u>http://beta-beam-parameters.web.cern.ch/beta-beam-parameters/index.jsp</u>
[2] <u>http://beta-beam.web.cern.ch/beta-beam/task/docs/db/dbaccess.zip</u>
[3] <u>http://beta-beam.web.cern.ch/beta-beam/task/docs/db/dbaccess.htm</u>