Using the SACNA package - Calvin model

The purpose of this document is to give a short tutorial for the SACNA package.

Let's start by bringing the package functions to this notebook.

In[ ]:=
```
Quiet[ClearAll["Global`*"]];
 silenc···  borra todo
 Quiet[Remove["Global`*"]];
 silenc···  borra
SetDirectory[NotebookDirectory[]];
 establece direct···  directorio de cuaderno

Quiet[Get["../SACNA.wl"]]
 silenc···  recibe
```

Now let's input the reactions and rates lists of this model. If we input the rates list as an empty list, SACNA will assign rates by default. Reactions must be in terms of D-species, L-species, Z-species (achiral species), and the empty specie N1.

In[ ]:=
```
reactions = {"L1->D1", "D1->L1", "L1->L2", "D1->D2", "L2->L1",
    "D2->D1", "L1+L2->2L2", "D1+D2->2D2", "2L2->L1+L2", "2D2->D1+D2"};
rates =
    {};
```

Now we can run the semialgebraic analysis of the model by using the `RunSemiAlgebraicAnalysis` function. The first parameter corresponds to the reactions' list, the second parameter corresponds to the rates' list, and the last parameter corresponds to time in seconds (the Collins' algorithm may take so much time to find a solution). The function will ask for the Routh-Hurwitz condition number. Considering the first and last numbers will be faster, because this conditions are shorter than the others. For this particular example we will be choose the first condition.

```
time = 60;
cadSolutions = RunSemiAlgebraicAnalysis[reactions, rates, time]
```

Out[ ]=
```
False
```

The algorithm found that the first Routh-Hurwitz condition has no solutions. Let's try with the second condition.

In[●]:=
```
time = 60;
cadSolutions = RunSemiAlgebraicAnalysis[reactions, rates, time]
```

Out[●]=
```
False
```

Again the algorithm found no solutions. Since we only have 2 Routh-Hurwitz conditions, and both of them lead us to no solutions, we can conclude that this model cannot produce SMSB.