Roteiro – 1- PRÁTICA

Aula de Tecnologia de deposição

PPGIO

1^0 Trimestre de 2020

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Como abaixar o programa: http://www.srim.org/

Download: http://www.srim.org/SRIM/SRIMLEGL.htm

1.1.Sugiro abaixar a versão 2008, pois não tem erros:

1.2.- DOWNLOAD SRIM-2008

SRIM-2008 is about 10 MB

Quando clicar na versão 2008, ira abaixar ym document SRIM-2008.e

Mudar para SRIM-2008.exe, seguindo a explicação abaixo:

- **SRIM Installation Instructions**

- **Both download files are called SRIM-2008.e, and are self-extracting ZIP files.**
  - **Put this file into a new directory called SRIM-2013, and rename the file to SRIM-2008.exe.**
  - **Execute this renamed file to extract all the SRIM files.**
  - **About 500+ files will be extracted.**
  - **If you have previously had SRIM on your PC, you should have no further problems. Find the file SRIM.exe in the root directory to start SRIM.**
  - **If your PC has NOT had SRIM on it before, then read _SRIM Setup Message in the SRIM root directory for setup instructions. Some standard Windows files may be missing from computers using Win-Vista or Win-7 systems, and this SETUP program installs them.**

Quando o programa estiver funcionando, seguir os passos abaixo. Inicialmente coloquei o tutorial para vocês se familiarizem com o programa. Na aula amanha, irei explicar junto a vocês passo a passo como fazer as simulações, mas preciso que já tenham o programa instalado.

1.Introdução

SRIM - Lessons and Tutorials

Several lessons are available to help students learn how to use SRIM. Each lessons is designed to take about 45 minutes. For background details, see the SRIM Textbook.

All Tutorials are in the subdirectory: SRIM / SRIM Tutorials

#1 - Ion Ranges - This tutorial discusses how to find the ion type and energy to implant an n-well in a CMOS circuit. No knowledge of electronics is required, it is just an example. The student uses the Stopping and Range Tables to find the correct ion energy. The student then sets up TRIM to calculate the full profile and to estimate the damage produces. The final step is to determine if an amorphous layer has been produced in the target..

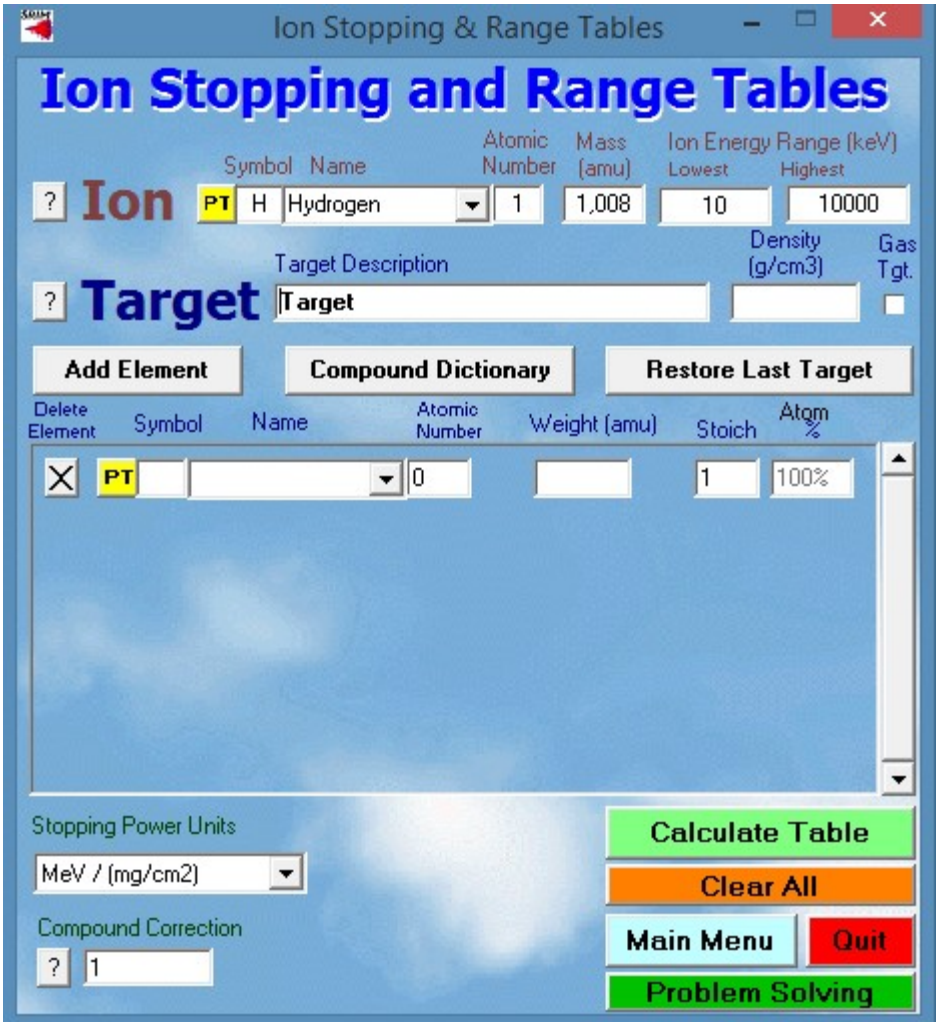
#2 - Mixing and Sputtering - This tutorial discusses how to analyze interface mixing and cross-contamination between layers due to ion collisions. Then it discusses target sputtering, and the limitations on calculating this factor using only theoretical calculations. In particular, the effects of surface roughening and surface damage are discussed.

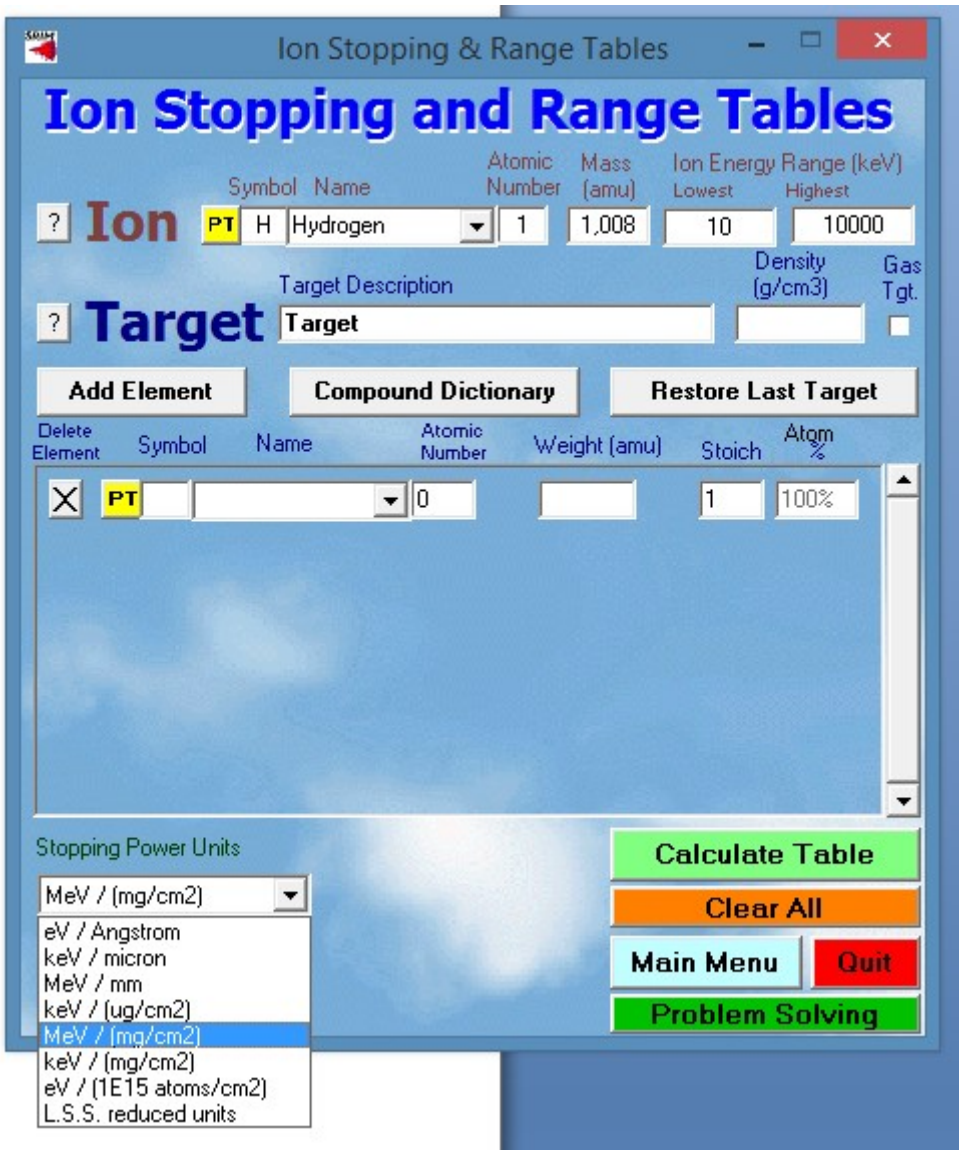
#3 - Building Layered Targets - This tutorial shows the student how to construct a Gas Proportional Detector target for an ion beam. This is a mixed solid/gas target, and the student learns how to adjust widths during the TRIM calculation so that immediate feed-back allows quick determination of the correct detector dimensions. A final segment of the lesson describes special options available in TRIM to made more advanced calculations.

#4 - Calculating Target Damage - This tutorial describes how ions damage crystalline material, creating displacements, vacancies, interstitials and replacement collisions. Each of these is clearly defined, along with a discussion of typical associated energies. Finally, a

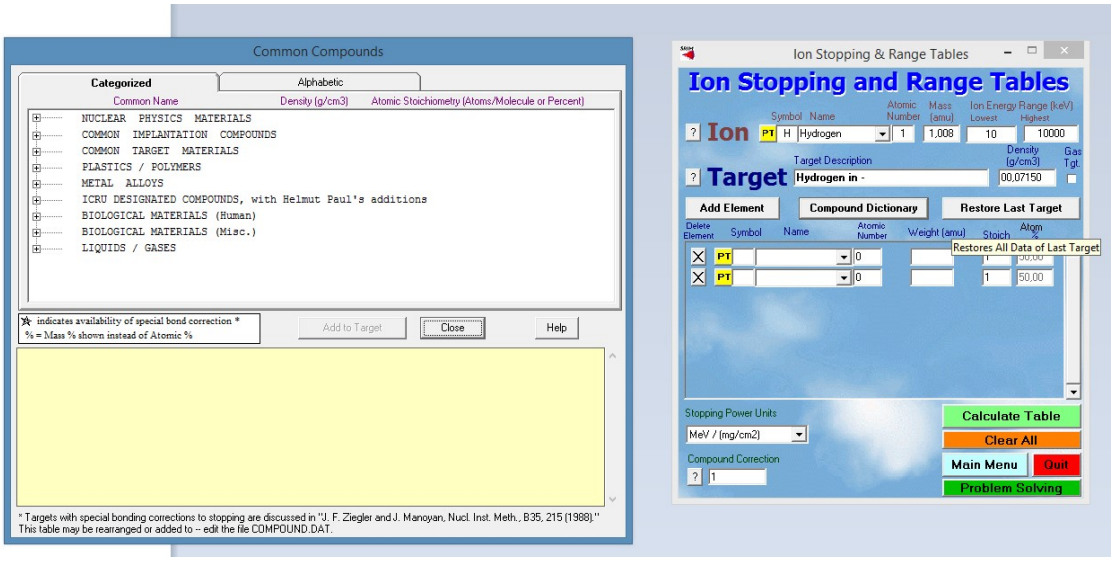
discussion is made of energy loss to the target electrons (electronic losses) and to the target nuclei (phonons).

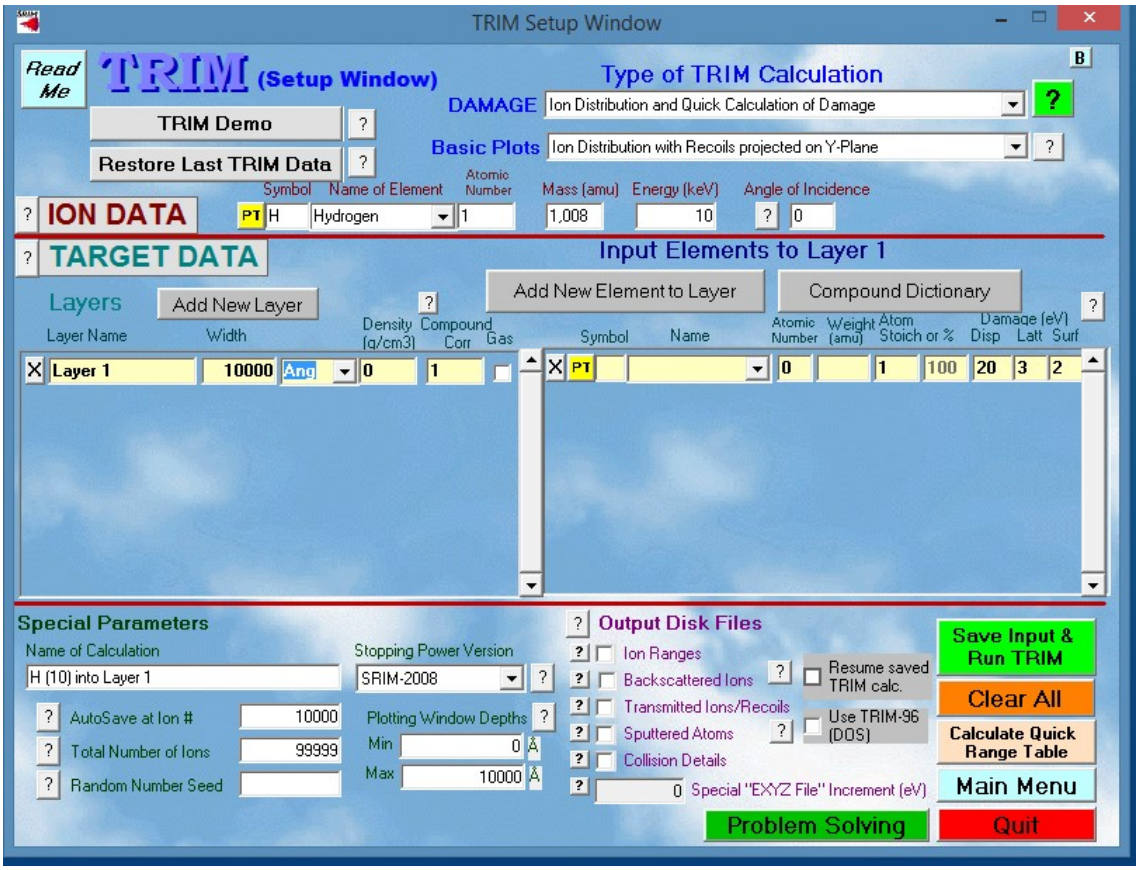
We would like to hear from any Instructors who use SRIM in university courses and have built similar modules. We especially need modules written in languages other than English. If you have anything that might be useful, please mail a copy to the author with an explanation of what level of students can use it.




Ion Stopping & Range Tables
Ion Stopping and Range Tables
Ion
Symbol
Name
Atomic Number
Mass (amu)
Ion Energy Range (keV)
Lowest
Highest
PT
H
Hydrogen
1
1,008
10
10000
Target
Target Description
Density (g/cm3)
Gas Tgt.
Target
Add Element
Compound Dictionary
Restore Last Target
Delete Element
Symbol
Name
Atomic Number
Weight (amu)
Stoich
Atom %
0
1
100%
Stopping Power Units
MeV / (mg/cm2)
eV / Angstrom
keV / micron
MeV / mm
keV / (ug/cm2)
MeV / (mg/cm2)
keV / (mg/cm2)
eV / (1E15 atoms/cm2)
L.S.S. reduced units
Calculate Table
Clear All
Main Menu
Quit
Problem Solving


Ion Stopping & Range Tables
Ion Stopping and Range Tables
Symbol
Name
Atomic Number
Mass (amu)
Ion Energy Range (keV)
Lowest
Highest
Ion
PT
H
Hydrogen
1
1,008
10
10000
Hydrogen
Helium
Lithium
Beryllium
Boron
Carbon
Nitrogen
Oxygen
Density (g/cm3)
Gas Tgt.
Target
Add Element
Restore Last Target
Delete Element
Symbol
Weight (amu)
Stoich
Atom %
100%
Stopping Power Units
MeV / (mg/cm2)
Compound Correction
Calculate Table
Clear All
Main Menu
Quit
Problem Solving


Common Compounds
Categorized
Alphabetic
Common Name
Density (g/cm3)
Atomic Stoichiometry (Atoms/Molecule or Percent)
NUCLEAR PHYSICS MATERIALS
COMMON IMPLANTATION COMPOUNDS
COMMON TARGET MATERIALS
PLASTICS / POLYMERS
METAL ALLOYS
ICRU DESIGNATED COMPOUNDS, with Helmut Paul's additions
BIOLOGICAL MATERIALS (Human)
BIOLOGICAL MATERIALS (Misc.)
LIQUIDS / GASES
indicates availability of special bond correction *
% = Mass % shown instead of Atomic %
Add to Target
Close
Help
* Targets with special bonding corrections to stopping are discussed in "J. F. Ziegler and J. Manoyan, Nucl. Inst. Meth., B35, 215 (1988)."
This table may be rearranged or added to -- edit the file COMPOUND.DAT.
Ion Stopping & Range Tables
Ion Stopping and Range Tables
Restores All Data of Last Target



Prática 1:

1- Introdução

2- Aplicações

3- Simulação

Exemplo:

O objetivo desta foi a utilização do software SRIM para simular um bombardeio de íons de carbono com uma intensidade de energia de 200 a 500 MeV, incidindo sobre 0,5 mm de pele, seguido de 1 cm de glândulas mamárias.

Tabela 1: Energia do feixe de íons versus a profundidade do pico de Brag.

Energia (MeV)	Profundidade do Pico (mm)
200	1,24
300	2,60
400	4,38
500	6,09

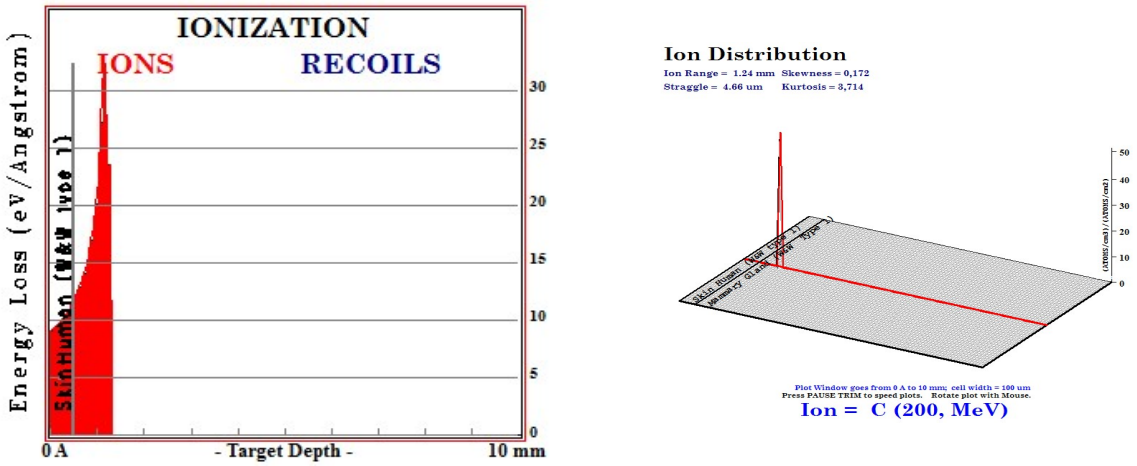


Figura 1: Ionização e distribuição de íons em 200 MeV.

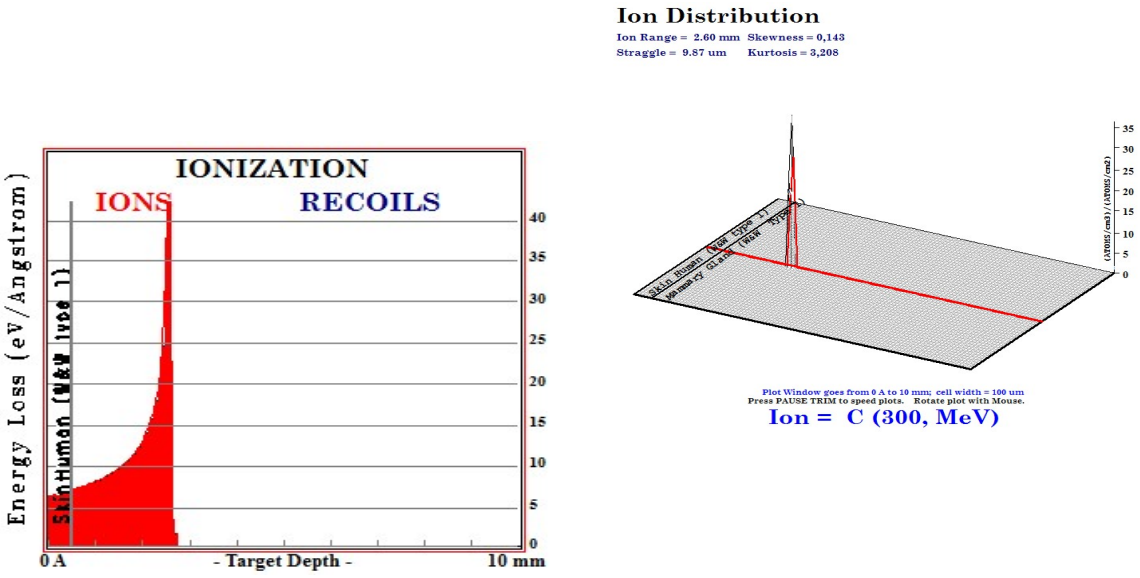


Figura 2: Ionização e distribuição de íons em 300 MeV.

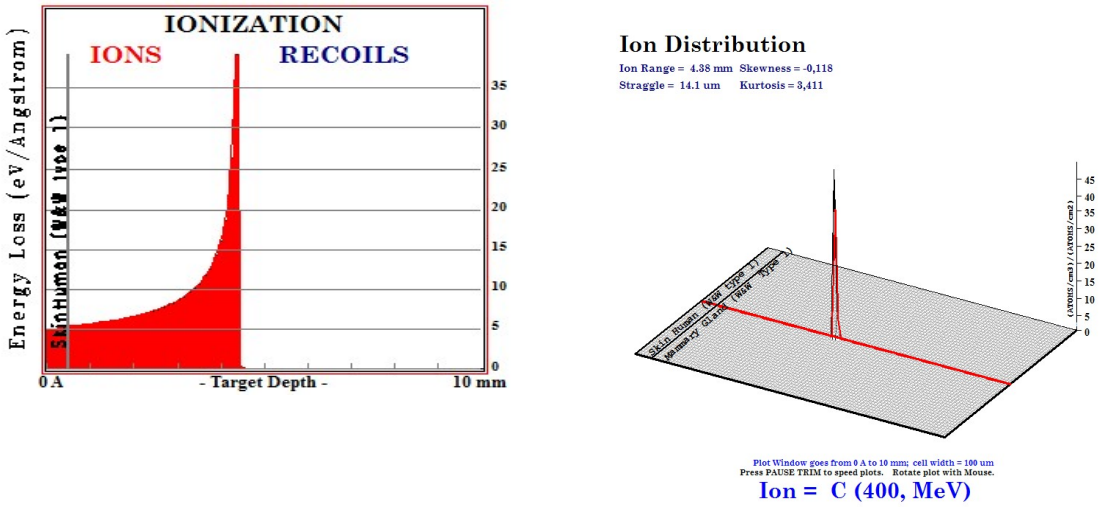


Figura 3: Ionização e distribuição de íons em 400 MeV.

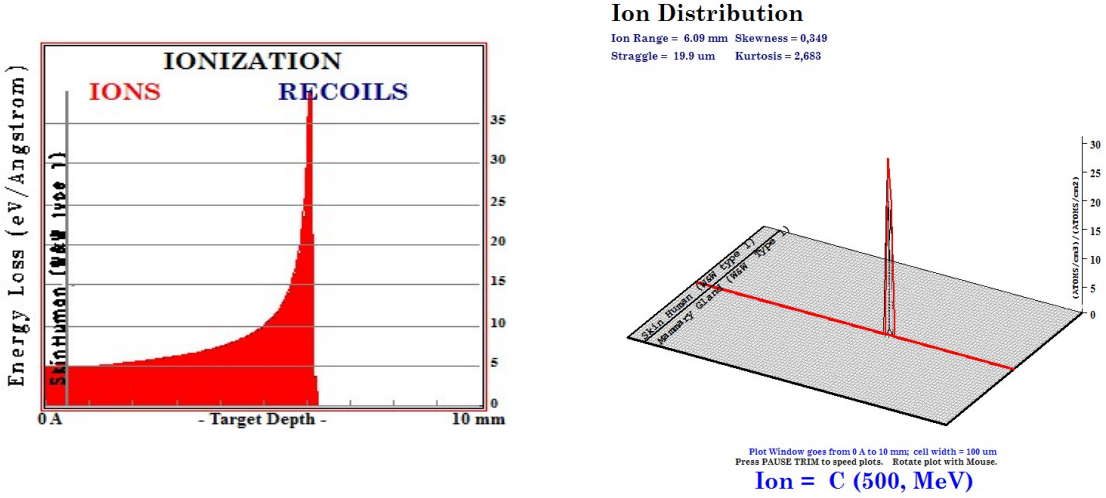


Figura 4: Ionização e distribuição de íons em 500 MeV.

4-Resultados Obtidos

5- Conclusão