Taras Shevchenko National University of Kyiv Department of nuclear physics and high energy physics

USING FREE SOFTWARE TO TEACH MEDICAL PHYSICS STUDENTS

LEBED Viktoriia

Bachelor of the 4th year to study



Motivation

Problem: Many educational institutions in Ukraine have problems with funding and obtaining license for programs which can be used to teach medical physics students

Required software for educational purposes:

- free/open source
- allows to work with real data
- can perform complex calculation for different types of doses



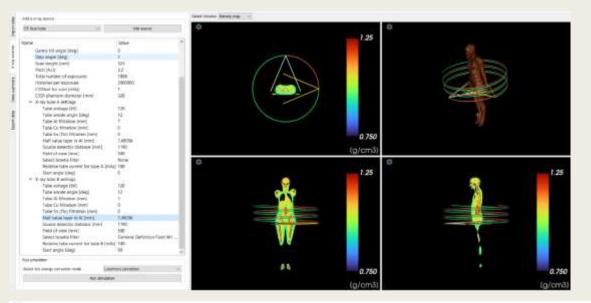
Software review

OpenDXMC (visualizing and calculation)

- ADRC(calculation)
- DC_PAK3(calculation)
- DCAL(calculation)
- AcuteDose (calculation)
- PRIMO



OpenDXMC



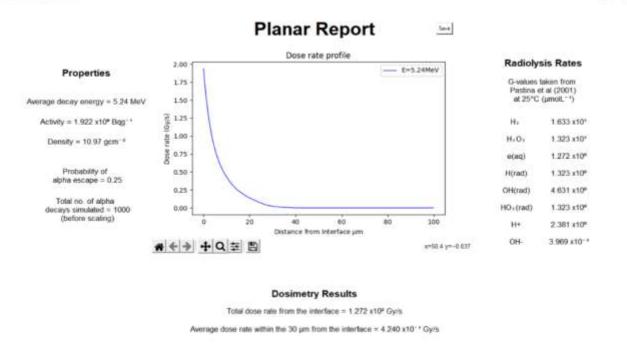
- calculation and visualizing dose
 distribution in diagnostic X-ray
 examination
- just an alpha version Result:
- dose values for each organs and materials

Color	foliarbannius) muannius		Mass (kg)			Dose stokey (mGy)	Done :		Number of volume (N)	Number of events (N	Done variance (m
	Air. Dry (near sea tevel)		0.166866	158119	0 0		0		10369104	11067941	0
-	Teeth		0.0400063	14,5476	0,00309509 1	1,56174e-DH	0,00830	H117 II	954	12283	1,265.5e-09
	Mineral bone		3.20327	1666.67	1.01754 1	1,72774e-05	10.5444	L	109297	391708228	4.57267#-09
	Human, upper half, spongious		0.111903	84,4372	0.00385845 3	77001#-07	0.01453	103	6193	78213	4,473256-10
1	Humers, tower half, spiongiosa		0,0527679	47,2415	1,1361 0	2,000278133	3.02403	(acea	13782469	2,46631#-07
	Laiwen anni loones, spiongliosa		0,0932093	#1.6563	1,74973 0	000131755	1.484.9		5533	40402448	1,999164-07
- 3	Hand bories, sponglosa		0.0726145	65.1896	1.49972 0	000190819	3.0673		4275	26617435	2.24066e-07
	Claviches, spongiosa		0.04044488	33,9596	0.00587176 1	1.87372#-06	10,02300	127	2227	40898	1.93713e-09
-	tiranium, sponginsa		0.416069	124,03	0,000314671 2	7.70880,731er-008	0,005532	216.0	27964	21660	1.0000228-11
- 1	Fermista, uppler half, sponglissa		0.224949	215.067	0.676008 1	L80657e-05	1,46238	£	14105	39798912	3.29163e-08
	Fermiona, lower half, sponglosa		0.174615	156,333	0.00160587	1.23272e-07	0,00954	1071	10252	56606	1,16009e-10
										CONTRACT OF THE OWNER	a second a s
Color	Organ name	Mass (Kg)	Volume (cm3)	Dose (mGy)	Dose stddere (mGy	 Close max value 	STOC 233			dt (N) Done variance	[mGy^2]
	Air, Dry (mear ona level)	0,166886	158119	D		0		10369104	11067941		
-	Adrenal, left	0.00573285	5.545309		9,6405e-05	0,574447		306.5	4669023	5.61034e-07	
	Adrenal, right	0.00727207							A second s	and the second sec	
_			7.0003		0.000290513	1.00531		463	1447626	1.05831e-06	
	Antenor basat passage (ET1)	0.00431929	4,19348	0.00116538	4.19851e-06	0.00565107		275	1420	2,90507a-09	
	Posterior nasar passage down to largins (ET2)	0.00431929 0,014288	4,19348 13,8766	0.00116538 0.000601938	4.19851e-06 7.77059e-07	0.00565107 0,00443547		275 91d	1420 2667	2.90507a-09 4,26033a-10	
	Posterior nasar passage down to taryns (ETJ) Oral murosa, torique	0.00431929 0,014288 0,0184451	4,19348 13,8786 17,3669	0,00116638 0,000601938 0,000682751	4.19851e-06 7.77059e-07 7.27419e-07	0.00565107 0.00664059		275 91a 1152	7420 2667 4559	2.90507e-09 4.26033e-10 5.26794e-10	
	Posterior hasar passage down to laryns (ET2) Oral muscosa tongue Oral muscosa, lips and cheeks	0.00431929 0.014293 0.0184451 0.00400288	4,19348 13,8786 17,3669 3,81226	0.000116528 0.0004011838 0.000882751 0.00102038	4,19851e-06 7,77059e-07 7,27419e-07 3,51909e-06	0.00565107 0.00442547 0.00664059 0.00480946		275 91a 1152 250	1420 2007 4559 1147	2.90507a-09 4.26033a-10 5.26794e-10 2.86407e-09	
	Posterior nasar passage down to laryns (ET2) Oral muscosa, fongue Oral muscosa, lips and cheeks Traches	0.00431929 0.014293 0.0184451 0.00400200 0.00799456	4,19348 12,8786 17,3669 3,81226 7,76125	0,00116528 0,0004001938 0,000882751 0,00102038 0,00496159	4.19851e-06 7,77059e-07 7,27419e-07 3,51909e-06 6,23714e-06	0.00565107 0.006443547 0.00684059 0.00400646 0.0150588		275 91d 1152 250 509	1420 2687 4539 1147 11772	2.90507e-09 4.36033e-10 5.26794e-10 2.86407e-09 5.45093e-09	
	Posterior nakar pakaage down to largink (ET2) Oral muscose, tongue Oral muscose, fips and cheeks Traches Bronkfu	0.00431929 0.014293 0.0184451 0.00400206 0.00799456 0.00099856	4,19348 13,8786 17,3669 3,51226 7,76175 8,43271	0,00116638 0,000601998 0,000882751 0,00102038 0,00496159 0,0199827	4.19851e-06 7,77059e-07 7,27415e-07 3,51909e-06 6,23714e-06 1,48019e-05	0.00565107 0.006443147 0.00664059 0.00400546 0.0150568 0.0150568		275 914 1182 250 509 984	1420, 2007 4539 1147 11772 40017	2.90507e-09 4,36033e-10 3.36794e-10 2.86407e-09 6.45893e-09 3,33558e-08	
	Posterior nasar passage down to laryns (ET2) Oral muscosa, fongue Oral muscosa, lips and cheeks Traches	0.00431929 0.014293 0.0184451 0.00400200 0.00799456	4,19348 12,8786 17,3669 3,81226 7,76125	0,00116638 0,0006011936 0,000682751 0,00102038 0,00102038 0,0109057 0,000051924	4.19851e-06 7,77059e-07 7,27415e-07 3,51909e-06 6,23714e-06 1,48019e-05	0.00565107 0.006443547 0.00684059 0.00400646 0.0150588		275 91d 1152 250 509	1420 2687 4539 1147 11772	2.90507e-09 4.36033e-10 5.26794e-10 2.86407e-09 5.45093e-09	



ADRC

Algha Dove Rate Calculator VI.1



Need to know:

- distance to the source
- activity of isotope
- alpha particle energy

- can calculating alpha radiation dose
- can handle up to 100 isotopes or custom energy inputs per calculation

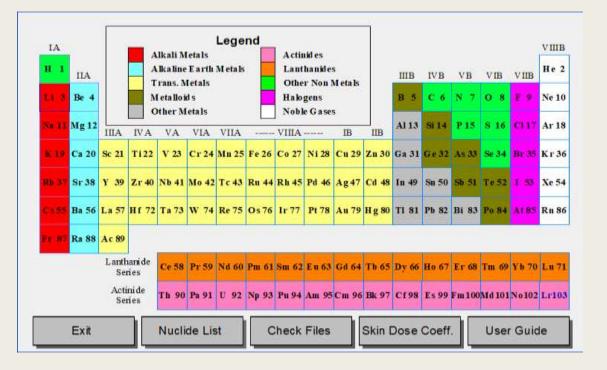
_

D X

- only applicable to UO2 in water



DC_PAK3



Need to know:

- particle characteristics
- respiratory parameters
- time of exposure to the contaminated area

- calculates the inhalation dose



Summary

I have reviewed several open sources programs that can help in teaching medical physics students. The introduction of free software into medical physics teaching programs will provide students with access to modern tools, facilitate their practical learning, and improve the quality of education. This will be a great opportunity for many students, regardless of the financial capabilities of the educational institution. The use of open source programs will allow the integration of the latest technologies into the educational process, making it more relevant and practically oriented.



