

Work in progress 07/05/2019

KM3NeT: water properties study

Meriem Bendahman

Pr. Yahya Tayalati

# Outline

- **Object and material**
- **Resultts**
- **Work in progress**
- **Conclusion**

# Objects and materials

## Objects

**A new water models with more scattering and less absorption**

- **Water sea:** uniformly transparent medium.
- **Transparency:** **absorption + scattering**
- **Optical background noise:** bioluminescence + decay of radioactive elements.
- **Cherenkov photons** must be **simulated** and **propagated** in the water.
- The number of **photons** detected **must be sampled from the photon tables** (PDFs: the probability density functions of the arrival time of the Cherenkov light)

## materials

**JMakePDF** one of the applications that can be found on Jpp

- **For the creation of PDFs :**  
`JMakePDF.sh -W <your preferred working directory> -P`
- **To merge PDFs tables :**  
`JMakePDF.sh -W <your preferred working directory> -Mcc`

# Results

2-Running locally the script : JMakePDF.sh -W <your preferred working directory> -P

We obtain the data in binary format:

J13p.dat	J14p-370.0.dat	J1p.dat	J3p-170.0.dat	J3p-32.0.dat	J3p-80.0.dat	J4p-14.0.dat	J4p-290.0.dat	J4p-65.0.dat	J6p-120.0.dat	J6p-24.0.dat	J6p-60.0.dat
J14p-0.1.dat	J14p-400.0.dat	J2p.dat	J3p-17.0.dat	J3p-34.0.dat	J3p-8.0.dat	J4p-150.0.dat	J4p-30.0.dat	J4p-70.0.dat	J6p-12.0.dat	J6p-250.0.dat	J6p-6.0.dat
J14p-0.5.dat	J14p-40.0.dat	J3p-0.1.dat	J3p-18.0.dat	J3p-36.0.dat	J3p-85.0.dat	J4p-15.0.dat	J4p-3.0.dat	J4p-7.0.dat	J6p-130.0.dat	J6p-26.0.dat	J6p-65.0.dat
J14p-100.0.dat	J14p-430.0.dat	J3p-0.3.dat	J3p-190.0.dat	J3p-38.0.dat	J3p-90.0.dat	J4p-16.0.dat	J4p-310.0.dat	J4p-75.0.dat	J6p-13.0.dat	J6p-28.0.dat	J6p-70.0.dat
J14p-10.0.dat	J14p-460.0.dat	J3p-0.5.dat	J3p-19.0.dat	J3p-40.0.dat	J3p-9.0.dat	J4p-170.0.dat	J4p-32.0.dat	J4p-80.0.dat	J6p-140.0.dat	J6p-30.0.dat	J6p-7.0.dat
J14p-1.0.dat	J14p-490.0.dat	J3p-100.0.dat	J3p-20.0.dat	J3p-4.0.dat	J3p-95.0.dat	J4p-17.0.dat	J4p-34.0.dat	J4p-8.0.dat	J6p-14.0.dat	J6p-3.0.dat	J6p-75.0.dat
J14p-120.0.dat	J14p-50.0.dat	J3p-10.0.dat	J3p-2.0.dat	J3p-42.0.dat	J4p-0.1.dat	J4p-18.0.dat	J4p-36.0.dat	J4p-85.0.dat	J6p-150.0.dat	J6p-32.0.dat	J6p-80.0.dat
J14p-150.0.dat	J14p-5.0.dat	J3p-1.0.dat	J3p-210.0.dat	J3p-44.0.dat	J4p-0.3.dat	J4p-190.0.dat	J4p-38.0.dat	J4p-90.0.dat	J6p-15.0.dat	J6p-34.0.dat	J6p-8.0.dat
J14p-170.0.dat	J14p-520.0.dat	J3p-110.0.dat	J3p-22.0.dat	J3p-46.0.dat	J4p-0.5.dat	J4p-19.0.dat	J4p-40.0.dat	J4p-9.0.dat	J6p-16.0.dat	J6p-36.0.dat	J6p-85.0.dat
J14p-190.0.dat	J14p-550.0.dat	J3p-11.0.dat	J3p-230.0.dat	J3p-48.0.dat	J4p-100.0.dat	J4p-20.0.dat	J4p-4.0.dat	J4p-95.0.dat	J6p-170.0.dat	J6p-38.0.dat	J6p-90.0.dat
J14p-20.0.dat	J14p-600.0.dat	J3p-120.0.dat	J3p-24.0.dat	J3p-50.0.dat	J4p-10.0.dat	J4p-2.0.dat	J4p-42.0.dat	J5p.dat	J6p-17.0.dat	J6p-40.0.dat	J6p-9.0.dat
J14p-210.0.dat	J14p-60.0.dat	J3p-12.0.dat	J3p-250.0.dat	J3p-5.0.dat	J4p-1.0.dat	J4p-210.0.dat	J4p-44.0.dat	J6p-0.1.dat	J6p-18.0.dat	J6p-4.0.dat	J6p-95.0.dat
J14p-230.0.dat	J14p-650.0.dat	J3p-130.0.dat	J3p-26.0.dat	J3p-55.0.dat	J4p-110.0.dat	J4p-22.0.dat	J4p-46.0.dat	J6p-0.3.dat	J6p-190.0.dat	J6p-42.0.dat	
J14p-250.0.dat	J14p-700.0.dat	J3p-13.0.dat	J3p-270.0.dat	J3p-60.0.dat	J4p-11.0.dat	J4p-230.0.dat	J4p-48.0.dat	J6p-0.5.dat	J6p-19.0.dat	J6p-44.0.dat	
J14p-270.0.dat	J14p-70.0.dat	J3p-140.0.dat	J3p-28.0.dat	J3p-6.0.dat	J4p-120.0.dat	J4p-24.0.dat	J4p-50.0.dat	J6p-100.0.dat	J6p-20.0.dat	J6p-46.0.dat	
J14p-290.0.dat	J14p-750.0.dat	J3p-14.0.dat	J3p-290.0.dat	J3p-65.0.dat	J4p-12.0.dat	J4p-250.0.dat	J4p-5.0.dat	J6p-10.0.dat	J6p-2.0.dat	J6p-48.0.dat	
J14p-30.0.dat	J14p-800.0.dat	J3p-150.0.dat	J3p-30.0.dat	J3p-70.0.dat	J4p-130.0.dat	J4p-26.0.dat	J4p-55.0.dat	J6p-1.0.dat	J6p-210.0.dat	J6p-50.0.dat	
J14p-310.0.dat	J14p-80.0.dat	J3p-15.0.dat	J3p-3.0.dat	J3p-7.0.dat	J4p-13.0.dat	J4p-270.0.dat	J4p-60.0.dat	J6p-110.0.dat	J6p-22.0.dat	J6p-5.0.dat	
J14p-340.0.dat	J14p-90.0.dat	J3p-16.0.dat	J3p-310.0.dat	J3p-75.0.dat	J4p-140.0.dat	J4p-28.0.dat	J4p-6.0.dat	J6p-11.0.dat	J6p-230.0.dat	J6p-55.0.dat	

# Results

2- Running locally the script : JMakePDF.sh -W <your preferred working directory> -Mcc

**Datas** are obtained in **binary format**: These datas represent **the fusion of PDFs**

```
[m.bendahman@login Jpp]$ cd PDF_TEST3
[m.bendahman@login PDF_TEST3]$ ls
I13p.dat I14p.dat I1p.dat I2p.dat I5p.dat I6p.dat J13p.dat J14p.dat J1p.dat J2p.dat J3p.dat J4p.dat J5p.dat J6p.dat
```

# Results

2- To view the contents of a file in binary: `$ xxd -b file`

```
[m.bendahman@login PDF_TEST3]$ xxd -b Jlp.dat
000000: 00111001 00000000 00000000 00000000 10011010 10011001 9.....
000006: 10011001 10011001 10011001 10011001 10111001 00111111 .....?
00000c: 00011010 00000000 00000000 00000000 00000000 00000000 .....
000012: 00000000 00000000 00000000 00000000 00000000 00000000 .....
000018: 00000011 00000000 00000000 00000000 00000000 00000000 .....
00001e: 00000000 00000000 00000000 00000000 00000000 00000000 .....
000024: 00000000 00000000 00000000 00000000 00000000 10010111 11010001 .....
00002a: 01111110 01011010 11111011 00100001 11111001 00111111 -Z.1.?
000030: 00000000 00000000 00000000 00000000 10010111 11010001 .....
000036: 01111110 01011010 11111011 00100001 00010001 01000000 -Z.1.@
00003c: 00000000 00000000 00000000 00000000 01010110 10111001 ....V.
000042: 00010011 10010110 10111111 00010101 11000000 00111111 .....?
000048: 00000100 00000000 00000000 00000000 00000000 00000000 .....
00004e: 00000000 00000000 00000000 00000000 00000000 00000000 .....
000054: 00000000 00000000 00000000 00000000 10111010 10001011 .....
00005a: 01010100 00111100 01010010 11000001 11110000 00111111 T<R..?
000060: 00000000 00000000 00000000 00000000 10111010 10001011 .....
000066: 01010100 00111100 01010010 11000001 00000000 01000000 T<R..@
00006c: 00000000 00000000 00000000 00000000 10010111 11010001 .....
000072: 01111110 01011010 11111011 00100001 00001001 01000000 -Z.1.@
000078: 00000000 00000000 00000000 00000000 01010110 10111001 ....V.
00007e: 00010011 10010110 10111111 00010101 11010000 00111111 .....?
000084: 00000111 00000000 00000000 00000000 00000000 00000000 .....
00008a: 00000000 00000000 00000000 00000000 00000000 00000000 .....
000090: 00000000 00000000 00000000 00000000 10111010 10001011 .....
000096: 01010100 00111100 01010010 11000001 11100000 00111111 T<R..?
00009c: 00000000 00000000 00000000 00000000 10111010 10001011 .....
0000a2: 01010100 00111100 01010010 11000001 11110000 00111111 T<R..?
0000a8: 00000000 00000000 00000000 00000000 10010111 11010001 .....
0000ae: 01111110 01011010 11111011 00100001 11111001 00111111 -Z.1.?
0000b4: 00000000 00000000 00000000 00000000 10111010 10001011 .....
0000ba: 01010100 00111100 01010010 11000001 00000000 01000000 T<R..@
0000c0: 00000000 00000000 00000000 00000000 10101000 10101110 .....
0000c6: 01101001 11001011 10100110 11110001 00000100 01000000 i....@
0000cc: 00000000 00000000 00000000 00000000 10010110 11010001 .....
0000d2: 01111110 01011010 11111011 00100001 00001001 01000000 -Z.1.@
0000d8: 00000000 00000000 00000000 00000000 00000001 10010110 .....
0000de: 00011101 01100001 10011111 00100000 11011000 00111111 .a. ?
```

# Work in progress

## The script

```
#!/bin/bash
#SBATCH --ntasks=1
#SBATCH --job-name="sing1"
#SBATCH --output="sing1.out"
#SBATCH --error="sing1.err"
#SBATCH --nodes=2

module load root/gcc/64/6.14.02
module load singularity

CONTAINER=/data/m.bendahman/jpp.smig

export ROOTSYS=/cm/shared/apps/root/gcc/64/6.14.02

export libCore=/cm/shared/apps/root/gcc/64/6.14.02/lib
export LD_LIBRARY_PATH=${libCore}/lib:${libCore}/lib:$LD_LIBRARY_PATH

bash

### Run

cd Jpp
source setenv.sh
srun JMakePDF.sh -W PDF1 -P

echo $?

echo "END OF THE SCRIPT"
```

Running the script on batch slurm

```
$ sbatch script.sh
```

Submitted batch job 8121

```
$ squeue -a
```

8045	mediumq	QE_Col	m.mouata	PD	0:00	1 (Resources)
8046	mediumq	QE_Co2	m.mouata	PD	0:00	1 (Resources)
8047	longq	QE_M0	m.dynar	PD	0:00	1 (Priority)
8065	shortq	QE_v	y.kaddar	PD	0:00	1 (Resources)
8092	shortq	Geant_OM	z.aboulb	PD	0:00	1 (Resources)
8121	defq	script1.	m.bendah	PD	0:00	1 (Resources)
1725	longq	G4Job	m.assalm	R	63-09:47:24	1 node03
1726	longq	G4Job	m.assalm	R	63-09:47:24	1 node03
1728	longq	G4Job	m.assalm	R	63-09:47:24	1 node03
1886	longq	G4Job	m.assalm	R	63-09:47:24	1 node03