The PTV program generates several files for each frame.

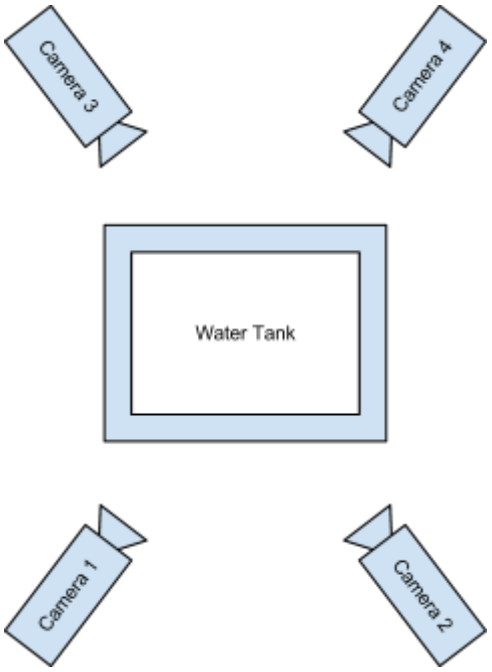
1 File Extensions
Each file is encoded according to the **Experiment** and **Frame** number as follows: ****.XXXYYYYY, where **** is the file name (see further on), XXX is the experiment number and YYYYY is the frame number in the experiment.

e.g. ***cam1.18612740*** is file cam1 for frame 12,740 in experiment 186.

2 File names
a In the **Image** folder
The image folder contains data from all (4) cameras in the experiment, each frame has 8 files (**frame** is the extension as described above):

i Image Files
cam1.**frame**, cam2.**frame**, cam3.**frame** and cam4.**frame** - are files representing the images encoded in tiff format. Thus e.g. ***cam1.18612740*** is the tiff image shot from camera 1 at frame 12740 of experiment 186.

Camera Placement:
A typical placement of 4 camera experiments is as follows:



It is, however, possible that in a given experiment the camera placement will differ, and this should be verified before processing the data.

ii Targets Files

Each image file has a target file associated with it, and named the same as the image with _targets added (e.g. **cam1_targets.18612740**).
These files contain information on all the detected particles in the image, and is formatted as a tab-delineated text file, with the following structure:

The first row contains only one column, specifying the number of particles detected in the image.

The other rows contain 8 columns each:
Particle number, x_location, y_location, area (pixels), x_length(pixels), y_length(pixels), sum of grayscale values in the particle, and correspondence.

The **particle ID** is arbitrary, and is given by the detection algorithm.

The **x and y location** are the location of the particle center of mass, and can thus have sub-pixel value

The **area** is the actual number of pixels taken up by the particle

The **x and y length** are the lengths of the major and minor axes of the particle (i.e. the length and the height of the particle if it were rotated to a horizontal position)

The **sum of grayscale** is the sum of all greyscale values of the particle

Correspondence is a flag that gets 1 if this particle was detected in more than one camera (i.e. if the particle is located on the intersection of 2 or more epipolar lines).
A particle that with a positive number in the **correspondence** flag gets an ID in the rt_is file (see below), and is located at the corresponding line there.

b In the Res folder

The res folder contains the tracking results from the whole sequence, and has 3 files per frame.

i **rt_is** Files

These files contain the summary of the particles found in the frame, formatted as a tab-delineated text file, with the following structure:

The first row contains only one column, specifying the number of particles in the file.

The other rows contain 8 columns each:
Particle number, x_location, y_location, z_location, id1, id2, id3, id4

The**particle ID** is arbitrary, and is given by the tracking algorithm.

The**x, y and z location** are the location of the particle in 3d, measured in mm.

id1, id2, id3, and **id4** are the particle IDs of that particle in corresponding camera frames. If the particle was not detected in a certain frame, its corresponding**id** is -1.

Note: rt_is files start with 1 and not 0, so the IDs need to be incremented by 1!

ii **ptv_is** Files

These are files used to track particles, and is essentially similar to the **rt_is** file, but with the following columns:
previous_particle, next_particle, x_location, y_location, z_location

Previous Particle is the particle ID of that particle in the previous frame, or -1 if it was first detected in the current frame.

Next Particle is the particle ID of that particle in the next frame, or -2 if it was not detected in the next frame.

iii **added** Files

These are files used to track particles added to the list of particles during the forward-backward-forward projection. It is essentially the same as the corresponding **ptv_is** file (see above), with the addition of a last column which is (always?) 4, and could signify the number of cameras over which the particle was identified.

3 Example

The following excerpt is taken from real data, and will serve to demonstrate the principle described above, in finding the corresponding particles in2 cameras and 2 consecutive frames.

Cam1.1881570_targets

0	188.0157	71.2563	70	12	9	4755	4
1	510.7900	727.0103	81	12	12	4966	-1
2	526.8192	731.3517	68	9	10	5031	-1
3	283.4068	857.8956	98	10	14	6061	6
4	421.0602	858.3607	61	8	9	5011	-1
5	586.3214	885.5790	91	11	12	7341	2
6	436.2219	897.8610	72	12	8	6657	3
7	423.2989	934.9218	58	9	8	4441	-1
8	286.2853	935.5972	75	11	9	6007	-1
9	328.5704	953.6870	92	14	13	5710	-1
10	803.2237	956.1561	93	10	12	5853	5
11	311.4330	961.1451	52	12	9	3505	-1
12	788.3494	962.1106	65	11	12	4641	-1
13	587.7373	965.4007	64	10	9	5731	-1
14	606.0490	966.3976	96	11	14	7184	0
15	743.8308	968.9774	47	12	8	3930	1
16	438.4469	976.9826	74	12	8	7248	-1

Cam2.1881570_targets

0	156.2952	70.5070	134	14	18	8915	4
1	293.7447	888.5812	45	8	7	3522	-1
2	309.0249	889.9497	79	10	10	8126	-1
3	167.0787	899.0667	139	13	15	9590	6
4	511.2831	904.0703	107	13	12	9909	2
5	374.7202	928.0799	80	12	10	7662	3
6	811.6678	958.1815	175	19	18	11543	5
7	768.1635	968.9733	110	13	15	9019	1
8	309.6357	971.2876	63	11	8	6145	-1
9	637.1509	978.0058	65	14	9	5818	-1
10	169.2018	984.0282	93	14	10	8309	-1
11	638.4713	985.9006	46	11	7	4036	0
12	511.7243	987.4343	87	12	11	8494	-1
13	343.5862	992.3641	101	13	14	7032	-1
14	330.3179	999.6801	77	13	13	4915	-1
15	375.5592	1011.6549	83	13	8	8639	-1

rt_is.1881570

1	19.760	-21.566	13.097	14	11	1	3
2	27.843	-21.650	10.756	15	7	2	4
3	14.160	-21.697	-8.902	5	4	7	10
4	5.371	-21.672	-3.974	6	5	5	8
5	-7.360	31.226	0.295	0	0	0	0
6	30.957	-21.673	7.585	10	6	4	-1
7	-6.806	-21.675	-13.673	3	3	-1	12

ptv_is.1881570

-1	-2	19.760	-21.566	13.097
-1	1	27.843	-21.650	10.756
-1	2	14.160	-21.697	-8.902
-1	3	5.371	-21.672	-3.974
-1	4	-7.360	31.226	0.295
-1	5	30.957	-21.673	7.585
-1	6	-6.806	-21.675	-13.673

Cam1.1881571_targets

0	189.6951	66.3870	70	13	9	4824	4
1	508.1175	726.8447	80	13	12	4978	-1
2	524.1867	730.6819	64	9	10	4970	-1
3	283.4493	858.0804	98	10	14	6011	6
4	421.2355	858.3376	63	9	9	5153	-1
5	586.3334	885.6771	90	11	12	7271	2
6	436.3070	897.9145	71	12	8	6622	3
7	423.4518	934.8504	58	9	8	4500	-1
8	286.4063	935.7937	76	11	9	5989	-1
9	328.5740	953.7270	94	14	13	5794	-1
10	803.4701	956.2263	95	10	12	5886	5
11	311.4401	961.0940	52	12	9	3520	-1
12	788.7515	961.8620	69	11	12	4796	-1
13	587.7941	965.4315	65	10	10	5811	-1
14	743.8123	969.0197	45	12	8	3862	1
15	606.0527	969.8404	55	11	9	3798	0
16	438.5650	977.0201	73	12	8	7231	-1

Cam2.1881571_targets

0	157.8065	65.4092	137	15	18	9070	4
1	293.7125	888.5901	44	8	7	3539	-1
2	309.0709	889.8436	81	10	10	8199	-1
3	167.2258	899.0484	139	13	15	9605	6
4	511.2097	904.0538	107	13	12	9938	2
5	374.8435	928.0656	80	13	10	7670	3
6	812.0149	957.9067	176	19	18	11357	5
7	767.9957	968.8161	105	13	15	8858	1
8	309.8046	971.1259	62	12	7	6202	-1
9	637.3011	977.7951	62	14	10	5577	-1
10	169.2734	984.0196	92	14	9	8256	-1
11	638.7861	985.6696	47	12	7	4163	0
12	511.6275	987.4053	90	13	11	8595	-1
13	343.4909	992.3166	102	13	15	7065	-1
14	330.2036	999.6162	79	13	13	4912	-1
15	375.6097	1011.6586	82	13	8	8630	-1

rt_is.1881571

1	19.784	-21.622	13.212	15	11	1	3
2	27.839	-21.655	10.724	14	7	2	4
3	14.157	-21.700	-8.907	5	4	7	10
4	5.377	-21.672	-3.972	6	5	5	8
5	-7.264	31.515	0.241	0	0	0	0
6	30.973	-21.670	7.581	10	6	4	-1
7	-6.799	-21.677	-13.661	3	3	-1	12

ptv_is.1881571

-1	0	19.784	-21.622	13.212
1	1	27.839	-21.655	10.724
2	2	14.157	-21.700	-8.907
3	3	5.377	-21.672	-3.972
4	4	-7.264	31.515	0.241
5	5	30.973	-21.670	7.581
6	6	-6.799	-21.677	-13.661

The fourth row in **cam1.1881570** (particle 3) has correspondence, and is linked to the 7th row (0-based 6 is 1-based 7, see note above) in **rt_is.1881570**. From it we learn that the corresponding particle in camera 2 in the same frame is ID 3 (marked yellow).
Next we look at the corresponding row in **ptv_is.1881570**, to find that this particle was not tracked in the previous frame (this is indeed the first frame of the sequence), and that in the next frame it is located in row 7 (ID 6) in **rt_is.1881571**, from which we proceed to identify the particles in **cam1.1881571** and **cam2.1881571**.

Another, similar process of identification with a different particle is marked green in the table.