

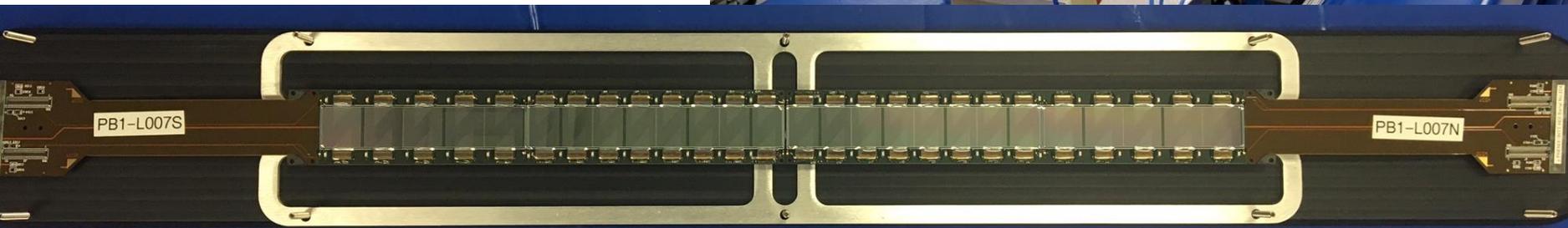
sPHENIX Intermediate Silicon Tracker (INTT)



October 14th, 2021

Our Focus:

- [Ladder Assembly](#)
- [CFC Support Structure](#)
- [Issues/Concerns](#)



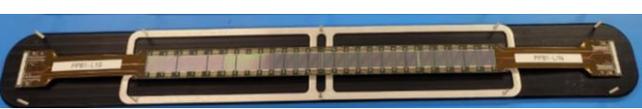


Status Ladders Mass Production



Assembly
at BNL

Production Ladders			HDIs/Chips																Chips/Sensors					Ladder Encapsulated																					
34	Barrel 1		South Chips/HDI Status																South Sensor Status					Encapsulation																					
48	Barrel 2		North Chips/HDI Status								North Chips/HDI Status								North Sensor Status					Encapsulation																					
81	Total		South Sensor Status								North Sensor Status								Encapsulation																										
Count	Barrel Type	Stave Batch-ID	U03	U05	U04	U03	U01	U03	U09	U18	U17	U16	U15	U14	U03	U05	U04	U03	U01	U03	U09	U18	U17	U16	U15	U14	File	Sensor A	Leakage Current nanoAmp	Sensor B	Leakage Current nanoAmp	File	Sensor A	Leakage Current nanoAmp	Sensor B	Leakage Current nanoAmp	File	Survey File	South	File	North	File			
	Hex Name	Hdi ID	U03	U05	U04	U03	U01	U03	U09	U18	U17	U16	U15	U14	U03	U05	U04	U03	U01	U03	U09	U18	U17	U16	U15	U14	Name	Leakage Current nanoAmp	Sensor B	Leakage Current nanoAmp	Name	Leakage Current nanoAmp	Sensor B	Leakage Current nanoAmp	Name	Survey File	South	File	North	File					
36	PB2-L018	2	BHD-72	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210716-093	2	164	2	142	20210719-09	2	148	2	110	20210825-1	2	2	20210909-1	2	20210909-1	228_0,5	228_0,5	20210909-1	228_0,5
37	PB2-L019	2	BHD-73	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210716-100	2	173	2	133	20210719-09	2	150	2	2000	20210825-1	2	2	20210914-1	2	20210914-1	416_0,5	416_0,5	20210914-1	416_0,5
38	PB2-L020	2	BHD-75	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210727-093	2	180	2	130	20210727-09	2	156	2	123	20210825-1	2	2	20210909-1	2	20210909-1	355_0,5	355_0,5	20210909-1	355_0,5
39	PB2-L021	2	BHD-76	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210716-172	2	180	2	190	20210719-17	2	160	2	201	20210826-1	2	2	20210914-1	2	20210914-1	437_0,5	437_0,5	20210914-1	437_0,5
40	PB2-L022	2	BHD-88	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210927-110	2	123	2	304	20211007-1	2	160	2	119	20211007-1	2	2	20211013-0	2	20211013-0	746_0,5	746_0,5	20211013-0	746_0,5
41	PB2-L023	2	BHD-78	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210736-130	2	146	2	185	20210826-1	2	131	2	190	20210826-1	2	2	20210915-1	2	20210915-1	514_0,5	514_0,5	20210915-1	514_0,5
42	PB2-L024	2	BHD-99	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210927-121	2	136	2	238	20211007-12	2	157	2	138	20211007-12	2	2	20210915-1	2	20210915-1	448_0,5	448_0,5	20210915-1	448_0,5
43	PB2-L025	2	BHD-82	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210913-104	2	130	2	192	20210909-10	2	150	2	132	20210909-10	2	2	20210915-1	2	20210915-1	540_0,5	540_0,5	20210915-1	540_0,5
44	PB2-L026	2	BHD-84	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210916-170	2	173	2	130	20210826-16	2	220	2	140	20210826-16	2	2	20210916-1	2	20210916-1	228_0,5	228_0,5	20210916-1	228_0,5
45	PB2-L027	2	BHD-85	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210916-172	2	143	2	120	20210830-17	2	161	2	134	20210830-17	2	2	20210916-1	2	20210916-1	323_0,5	323_0,5	20210916-1	323_0,5
46	PB2-L028	2	BHD-87	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210913-105	2	193	2	190	20210913-11	2	170	2	300	20210906-0	2	2	20210920-0	2	20210920-0	941_0,5	941_0,5	20210920-0	941_0,5
47	PB2-L029	2	BHD-88	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210913-112	1	0	1	8	20210913-11	1	141	1	112	20210913-11	1	1	20210917-0	1	20210917-0	941_0,5	941_0,5	20210917-0	941_0,5
47	PB2-L030	2	BHD-91	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210911-101	2	148	2	155	20210911-10	2	146	2	127	20210911-10	2	2	20210921-1	2	20210921-1	354_0,5	354_0,5	20210921-1	354_0,5
48	PB2-L031	2	BHD-93	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210911-110	2	189	2	130	20210911-10	2	190	2	210	20210911-10	2	2	20210914-1	2	20210914-1	459_0,5	459_0,5	20210914-1	459_0,5
49	PB2-L032	2	BHD-94	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210736-140	2	160	2	110	20210736-14	2	160	2	110	20210831-1	2	2	20210921-1	2	20210921-1	505_0,5	505_0,5	20210921-1	505_0,5
50	PB1-L019	1	BHD-75	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210913-163	2	133	2	126	20210913-16	2	130	2	144	20211012-1	2	2	20211012-1	2	20211012-1	834_0,5	834_0,5	20211012-1	834_0,5
51	PB1-L020	1	BHD-76	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210906-106	2	133	2	126	20210906-09	2	130	2	144	20211012-1	2	2	20211012-0	2	20211012-0	911_0,5	911_0,5	20211012-0	911_0,5
52	PB1-L021	1	BHD-78	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210926-124	2	155	2	196	20210926-12	2	137	2	147	20211012-1	2	2	20211012-1	2	20211012-1	40_0,5	40_0,5	20211012-1	40_0,5
53	PB1-L022	1	BHD-79	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210908-120	2	149	2	333	20210908-11	2	201	2	221	20211012-1	2	2	20211012-1	2	20211012-1	40_0,5	40_0,5	20211012-1	40_0,5
54	PB1-L023	1	BHD-80	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210913-170	2	157	2	302	20210913-16	2	162	2	149	20211012-1	2	2	20211012-1	2	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
55	PB1-L024	1	BHD-87	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210917-094	1	10	1	10	20210917-09	1	10	1	10	20210917-09	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
56	PB1-L025	1	BHD-86	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210917-100	1	10	1	10	20210917-09	1	10	1	10	20210917-09	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
57	PB1-L026	1	BHD-89	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210917-102	1	10	1	10	20210917-10	1	10	1	10	20210917-10	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
58	PB1-L027	1	BHD-90	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20211007-114	1	10	1	10	20211007-11	1	10	1	10	20211007-11	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
59	PB1-L028	1	BHD-81	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210908-123	1	10	1	10	20210908-12	1	10	1	10	20210908-12	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
60	PB1-L029	1	BHD-83	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210916-095	1	10	1	10	20210916-09	1	10	1	10	20210916-09	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
61	PB1-L030	1	BHD-84	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210916-095	1	10	1	10	20210916-09	1	10	1	10	20210916-09	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5	20211012-1	606_0,5
62	PB1-L031	1	BHD-85	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	20210926-112	1	10	1	10	20210926-11	1	10	1	10	20210926-11	1	1	20211012-1	1	20211012-1	606_0,5	606_0,5</		



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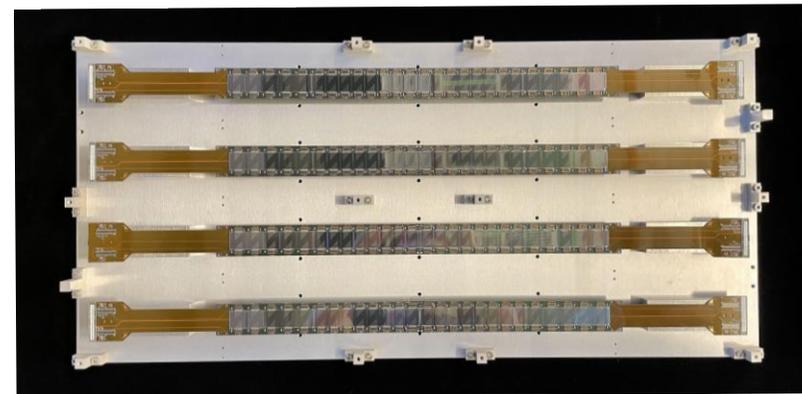
Production Ladders				HDIs/Chips														Chips/Sensors								Ladder Encapsulated																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
34 Barrel 1		48 Barrel 2		81 Total		South Chips/HDI Status														North Chips/HDI Status								Encapsulation																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Count	Barrel Type	HD/State	Glue	HD ID	U05	U06	U07	U08	U09	U10	U11	U12	U13	U14	U15	U16	U17	U18	U19	U20	U21	U22	U23	U24	U25	U26	U27	U28	U29	U30	U31	U32	U33	U34	U35	U36	U37	U38	U39	U40	U41	U42	U43	U44	U45	U46	U47	U48	U49	U50	U51	U52	U53	U54	U55	U56	U57	U58	U59	U60	U61	U62	U63	U64	U65	U66	U67	U68	U69	U70	U71	U72	U73	U74	U75	U76	U77	U78	U79	U80	U81	U82	U83	U84	U85	U86	U87	U88	U89	U90	U91	U92	U93	U94	U95	U96	U97	U98	U99	U100	U101	U102	U103	U104	U105	U106	U107	U108	U109	U110	U111	U112	U113	U114	U115	U116	U117	U118	U119	U120	U121	U122	U123	U124	U125	U126	U127	U128	U129	U130	U131	U132	U133	U134	U135	U136	U137	U138	U139	U140	U141	U142	U143	U144	U145	U146	U147	U148	U149	U150	U151	U152	U153	U154	U155	U156	U157	U158	U159	U160	U161	U162	U163	U164	U165	U166	U167	U168	U169	U170	U171	U172	U173	U174	U175	U176	U177	U178	U179	U180	U181	U182	U183	U184	U185	U186	U187	U188	U189	U190	U191	U192	U193	U194	U195	U196	U197	U198	U199	U200	U201	U202	U203	U204	U205	U206	U207	U208	U209	U210	U211	U212	U213	U214	U215	U216	U217	U218	U219	U220	U221	U222	U223	U224	U225	U226	U227	U228	U229	U230	U231	U232	U233	U234	U235	U236	U237	U238	U239	U240	U241	U242	U243	U244	U245	U246	U247	U248	U249	U250	U251	U252	U253	U254	U255	U256	U257	U258	U259	U260	U261	U262	U263	U264	U265	U266	U267	U268	U269	U270	U271	U272	U273	U274	U275	U276	U277	U278	U279	U280	U281	U282	U283	U284	U285	U286	U287	U288	U289	U290	U291	U292	U293	U294	U295	U296	U297	U298	U299	U300	U301	U302	U303	U304	U305	U306	U307	U308	U309	U310	U311	U312	U313	U314	U315	U316	U317	U318	U319	U320	U321	U322	U323	U324	U325	U326	U327	U328	U329	U330	U331	U332	U333	U334	U335	U336	U337	U338	U339	U340	U341	U342	U343	U344	U345	U346	U347	U348	U349	U350	U351	U352	U353	U354	U355	U356	U357	U358	U359	U360	U361	U362	U363	U364	U365	U366	U367	U368	U369	U370	U371	U372	U373	U374	U375	U376	U377	U378	U379	U380	U381	U382	U383	U384	U385	U386	U387	U388	U389	U390	U391	U392	U393	U394	U395	U396	U397	U398	U399	U400	U401	U402	U403	U404	U405	U406	U407	U408	U409	U410	U411	U412	U413	U414	U415	U416	U417	U418	U419	U420	U421	U422	U423	U424	U425	U426	U427	U428	U429	U430	U431	U432	U433	U434	U435	U436	U437	U438	U439	U440	U441	U442	U443	U444	U445	U446	U447	U448	U449	U450	U451	U452	U453	U454	U455	U456	U457	U458	U459	U460	U461	U462	U463	U464	U465	U466	U467	U468	U469	U470	U471	U472	U473	U474	U475	U476	U477	U478	U479	U480	U481	U482	U483	U484	U485	U486	U487	U488	U489	U490	U491	U492	U493	U494	U495	U496	U497	U498	U499	U500	U501	U502	U503	U504	U505	U506	U507	U508	U509	U510	U511	U512	U513	U514	U515	U516	U517	U518	U519	U520	U521	U522	U523	U524	U525	U526	U527	U528	U529	U530	U531	U532	U533	U534	U535	U536	U537	U538	U539	U540	U541	U542	U543	U544	U545	U546	U547	U548	U549	U550	U551	U552	U553	U554	U555	U556	U557	U558	U559	U560	U561	U562	U563	U564	U565	U566	U567	U568	U569	U570	U571	U572	U573	U574	U575	U576	U577	U578	U579	U580	U581	U582	U583	U584	U585	U586	U587	U588	U589	U590	U591	U592	U593	U594	U595	U596	U597	U598	U599	U600	U601	U602	U603	U604	U605	U606	U607	U608	U609	U610	U611	U612	U613	U614	U615	U616	U617	U618	U619	U620	U621	U622	U623	U624	U625	U626	U627	U628	U629	U630	U631	U632	U633	U634	U635	U636	U637	U638	U639	U640	U641	U642	U643	U644	U645	U646	U647	U648	U649	U650	U651	U652	U653	U654	U655	U656	U657	U658	U659	U660	U661	U662	U663	U664	U665	U666	U667	U668	U669	U670	U671	U672	U673	U674	U675	U676	U677	U678	U679	U680	U681	U682	U683	U684	U685	U686	U687	U688	U689	U690	U691	U692	U693	U694	U695	U696	U697	U698	U699	U700	U701	U702	U703	U704	U705	U706	U707	U708	U709	U710	U711	U712	U713	U714	U715	U716	U717	U718	U719	U720	U721	U722	U723	U724	U725	U726	U727	U728	U729	U730	U731	U732	U733	U734	U735	U736	U737	U738	U739	U740	U741	U742	U743	U744	U745	U746	U747	U748	U749	U750	U751	U752	U753	U754	U755	U756	U757	U758	U759	U760	U761	U762	U763	U764	U765	U766	U767	U768	U769	U770	U771	U772	U773	U774	U775	U776	U777	U778	U779	U780	U781	U782	U783	U784	U785	U786	U787	U788	U789	U790	U791	U792	U793	U794	U795	U796	U797	U798	U799	U800	U801	U802	U803	U804	U805	U806	U807	U808	U809	U810	U811	U812	U813	U814	U815	U816	U817	U818	U819	U820	U821	U822	U823	U824	U825	U826	U827	U828	U829	U830	U831	U832	U833	U834	U835	U836	U837	U838	U839	U840	U841	U842	U843	U844	U845	U846	U847	U848	U849	U850	U851	U852	U853	U854	U855	U856	U857	U858	U859	U860	U861	U862	U863	U864	U865	U866	U867	U868	U869	U870	U871	U872	U873	U874	U875	U876	U877	U878	U879	U880	U881	U882	U883	U884	U885	U886	U887	U888	U889	U890	U891	U892	U893	U894	U895	U896	U897	U898	U899	U900	U901	U902	U903	U904	U905	U906	U907	U908	U909	U910	U911	U912	U913	U914	U915	U916	U917	U918	U919	U920	U921	U922	U923	U924	U925	U926	U927	U928	U929	U930	U931	U932	U933	U934	U935	U936	U937	U938	U939	U940	U941	U942	U943	U944	U945	U946	U947	U948	U949	U950	U951	U952	U953	U954	U955	U956	U957	U958	U959	U960	U961	U962	U963	U964	U965	U966	U967	U968	U969	U970	U971	U972	U973	U974	U975	U976	U977	U978	U979	U980	U981	U982	U983	U984	U985	U986	U987	U988	U989	U990	U991	U992	U993	U994	U995	U996	U997	U998	U999	U1000	U1001	U1002	U1003	U1004	U1005	U1006	U1007	U1008	U1009	U1010	U1011	U1012	U1013	U1014	U1015	U1016	U1017	U1018	U10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Ladder assembly in Taiwan

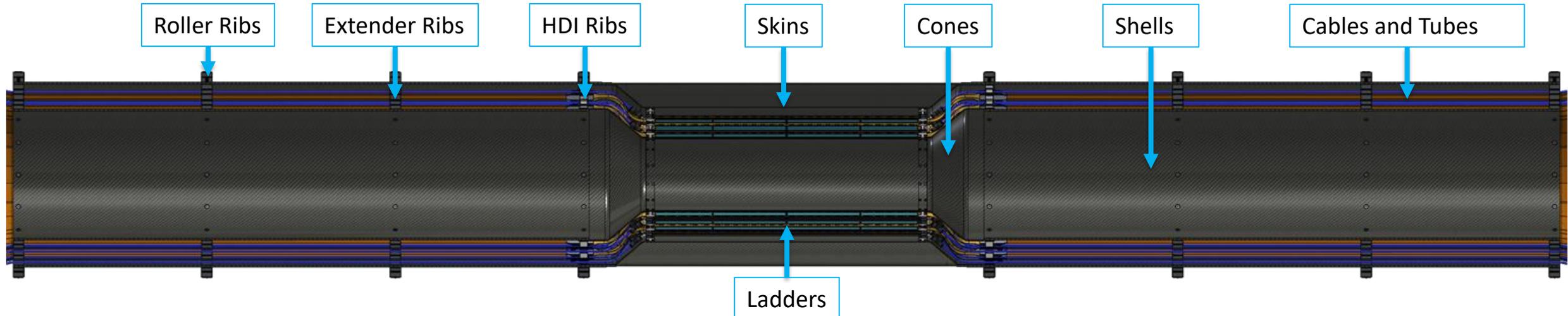
- 16 ladders are assembled in TW.
 - Class-1 : 11 ladders
 - Class-2 : 2 ladders
 - Not yet tested : 1 ladder

Practice, bad modules were used

Stave ID	N	S	done ?	# bad channel	class
"01-0015"	74	262	Y	2460	5
"01-0060"	51	264	Y	144	3
"02-0028"	44	pre004	Y	43	2
"02-0049"	263	48	Y	0	1
"02-0052"	254	49	Y	0	1
"02-0046"	255	257	Y	1	1
"02-0039"	77	78	Y	2	1
"02-0040"	73	71	Y	6	1
"02-0019"	53	54	Y	0	1
"02-0016"	52	55	Y	3	1
"02-0013"	58	59	Y	0	1
"02-0001"	253	256	Y	0	1
"02-0074"	76	261	Y	63	2
"02-0080"	24	258	Y	4	1
"02-0077"	57	259	Y	31	1
02-0083"	247	246			



TW group will keep working on ladder assembly and ladder source test

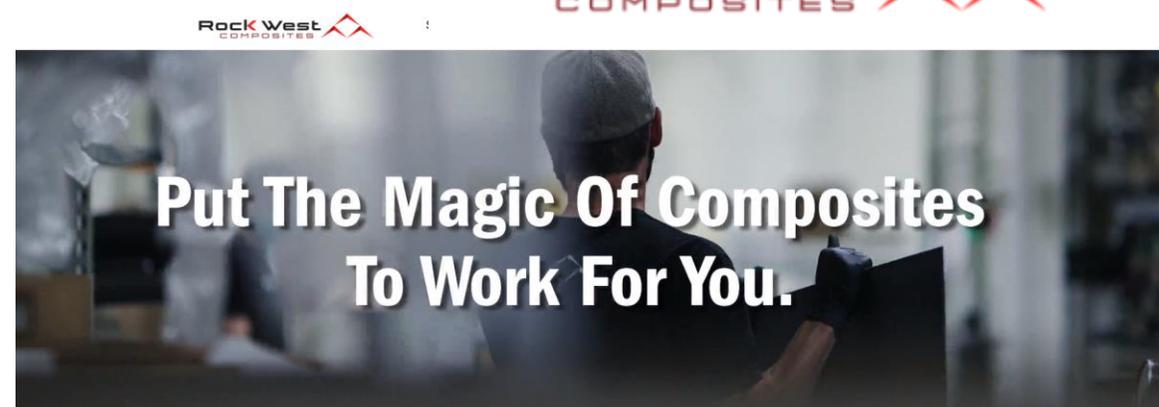
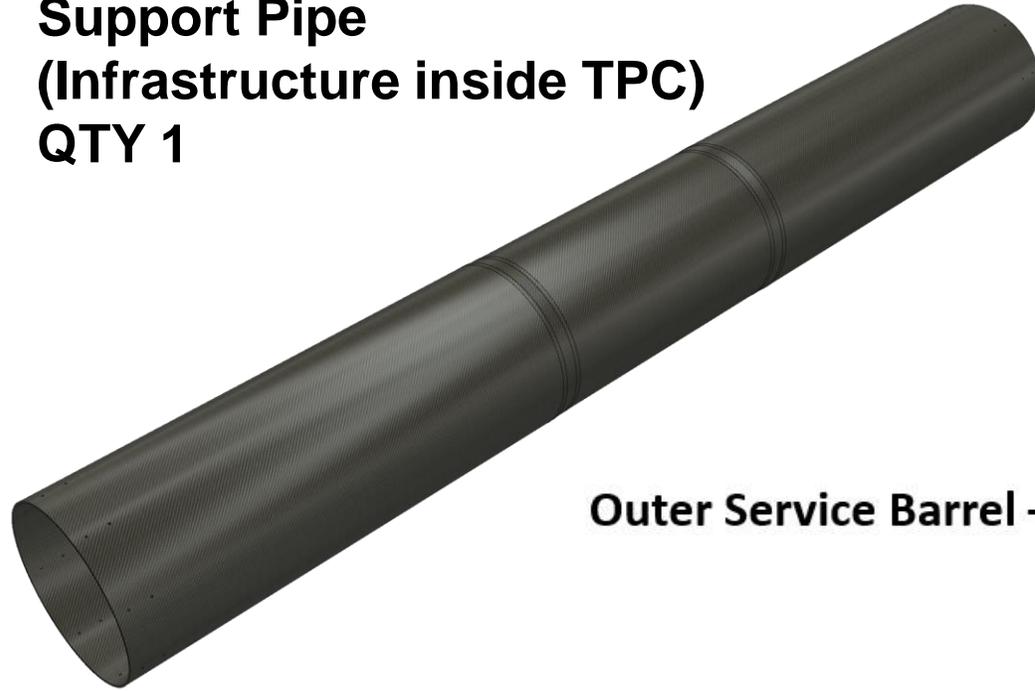


Description	QTY
Support Pipe	1
Outer Service Barrel	2
Inner Service Barrel	4
Outer End Ring Cone	4
Inner End Ring Cone	4
Outer Skin	2
Inner Skin	2

Reminder: Barrel – CFC Support Structure



**Support Pipe
(Infrastructure inside TPC)
QTY 1**



Expert in making CFC pipes

Outer Service Barrel – QTY 2

Inner Service Barrel – QTY 4



**Estimate: \$30K
(waiting final quote)**

**Estimate: \$30K
(waiting final quote)**

**Estimate: \$27K
(waiting final quote)**

ALICE/CMS/CNRS/MVX (sPHENIX)

Outer End Ring Cone – QTY 4



Inner End Ring Cone – QTY 4



Expert in making complex
CFC shapes and electrically
conductive

Outer Skin – QTY 2



Inner Skin – QTY 2





Offer n° 2110002 - USD

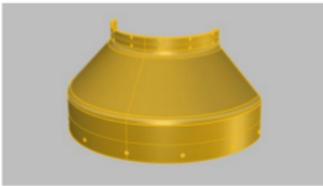
Destinataire:
BROOKHAVEN NATIONAL LABORATORY
Physics Department, Building 510c
20 Pennsylvania Avenue
Upton, New York, 11973
U.S.A.

référence: Fabrication of moulds and carbon composite parts - INTT CFC supports: inner cones

DATE: 05/10/2021

CONTACT: Simon Rubet, au 04 75 59 15 08

Notes about parts manufacturing: all carbon fiber parts proposed in Toray T800 fiber, equivalent to Mitsubishi Pyrofil MR60H. Resin proposed is a high end and versatile epoxy system (ER450) for which we provide a technical data sheet. All parts to be cured with autoclave. **Accuracy demanded: +/- 0,25mm, on the finished part.**

Inner end ring cone			
CAD/CAM study	1		2 480,00
Tools			
Main mould, carbon fiber, with inner carbon fiber caul plate			
Main model, milled epoxy block	1		846,00
Mould, tooling carbon fiber, autoclave curing	1		1 845,00
Caul plate mould	1		599,00
Carbon fiber caul plate	1		761,00

Milling jig for the final part	1		867,00
Carbon fiber parts manufacturing			
Mould preparation, prepreg draping, several vacuum compactions, autoclave cure - 7bars, 120° -	4	803,00	3 212,00
Parts milling and finishing	4	452,00	1 808,00
Controls			
Tools, 3D laser controls, romer arm	1		1 298,00
Part, 3D laser control, Romer arm	4	342,00	1 368,00
Packing and transport	1	796,00	796,00
Total for the inner end ring cones (4 parts) USD			\$15 880,00

This offer is based on the documentation provided. If major changings occure, a new proposal may have to be done.

Paiment conditions: a 30% account is demanded when ordering. Remaining amount to be paid when all parts are delivered, and accepted.

Leadtime: please refer to the proposed schedule.

WORKSHAPE, SARL au capital de 50 000 euro, APE 7112b

N° SIRET: 49501024100018, N° TVA: FR20495010241

WORK | SHAPE
 conception . prototype
 ZI Les Serres, 26600 La Roche de Glun
 tel: 04 75 59 15 08 fax: 04 75 84 57 51

Offer n° 2110001 - USD

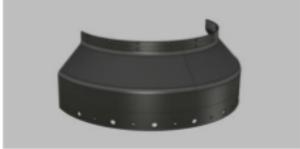
Destinataire:
BROOKHAVEN NATIONAL LABORATORY
 Physics Department, Building 510c
 20 Pennsylvania Avenue
 Upton, New York, 11973
 U.S.A.

Fabrication of moulds and carbon composite parts - INTT CFC supports: cones
référence:

DATE: 05/10/2021

CONTACT: Simon Rubet, au 04 75 59 15 08

Notes about parts manufacturing: all carbon fiber parts proposed in Toray T800 fiber, equivalent to Mitsubishi Pyrofil MR60H. Resin proposed is a high end and versatile epoxy system (ER450) for which we provide a technical data sheet. All parts to be cured with autoclave. **Accuracy demanded:** +/- 0,25mm, on the finished part.

Outer end ring cone			
CAD/CAM study	1		2 955,00
Tools			
Main mould, carbon fiber, with inner carbon fiber caul plate			
Main model, milled epoxy block	1		1 726,00
Mould, tooling carbon fiber, autoclave curing	1		2 444,00
Caul plate mould	1		1 028,00
Carbon fiber caul plate	1		832,00
Milling jig for the final part	1		1 089,00

Carbon fiber parts manufacturing			
Mould preparation, prepreg draping, several vacuum compactions, autoclave cure - 7bars, 120° -	4	904,00	3 616,00
Parts milling and finishing	4	513,00	2 052,00
Controls			
Tools, 3D laser controls, romer arm	1		1 416,00
Part, 3D laser control, Romer arm	4	360,00	1 440,00
Packing and transport	1	808,00	808,00
Total for the outer end ring cones (4 parts) USD			\$19 406,00

This offer is based on the documentation provided. If major changings occure, a new proposal may have to be done.

Paiment conditions: a 30% account is demanded when ordering. Remaining amount to be paid when all parts are delivered, and accepted.

Leadtime: please refer to the proposed schedule.

WORKSHAPE, SARL au capital de 50 000 euro, APE 7112b

N° SIRET: 49501024100018, N° TVA: FR20495010241

Barrel – CFC Support Structure (Inner and Outer Skins Final Costs)



ZI Les Serres, 26600 La Roche de Glun
tel: 04 75 59 15 08 fax: 04 75 84 57 51

Offer n° 2110003 - USD

Destinataire:

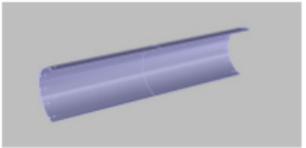
BROOKHAVEN NATIONAL LABORATORY
Physics Department, Building 510c
20 Pennsylvania Avenue
Upton, New York, 11973
U.S.A.

référence: Fabrication of moulds and carbon composite parts - INTT CFC supports: Inner and outer skins

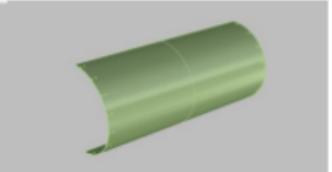
DATE: 05/10/2021

CONTACT: Simon Rubet, au 04 75 59 15 08

Notes about parts manufacturing: all carbon fiber parts proposed in Toray T800 fiber, equivalent to Mitsubishi Pyrofil MR60H. Resin proposed is a high end and versatile epoxy system (ER450) for which we provide a technical data sheet. All parts to be cured with autoclave. **Accuracy demanded: +/- 0,25mm, on the finished part.**

Inner skin			
CAD/CAM study	1		1 068,00
Tools			
Main mould, carbon fiber, with inner carbon fiber caul plate			
Main model, milled epoxy block	1		603,00
Mould, tooling carbon fiber, autoclave curing	1		901,00
Carbon fiber caul plate, from "foldable" plate	1		124,00
Milling jig for the final part	1		513,00

Page 1 de 3

Carbon fiber parts manufacturing			
Mould preparation, prepreg draping, autoclave cure - 7bars, 120° -	2	336,00	672,00
Parts milling and finishing	2	198,00	396,00
Controls			
Tools, 3D laser controls, romer arm	1		531,00
Part, 3D laser control, Romer arm	2	124,00	248,00
Total for the inner skins (2 parts) USD		\$5 056,00	
Outer skin			
CAD/CAM study	1		1 068,00
Tools			
Main mould, carbon fiber, with inner carbon fiber caul plate			
Main model, milled epoxy block	1		1 451,00
Mould, tooling carbon fiber, autoclave curing	1		1 410,00
Carbon fiber caul plate, from light milled mould	1		576,00
Milling jig for the final part	1		723,00
Carbon fiber parts manufacturing			
Mould preparation, prepreg draping, autoclave cure - 7bars, 120° -	2	385,00	770,00
Parts milling and finishing	2	274,00	548,00
Controls			

Tools, 3D laser controls, romer arm	1		602,00
Part, 3D laser control, Romer arm	2	159,00	318,00
Total for the inner skins (2 parts)		7 466,00	
Packing and transport	1		1 044,00
Total			13 566,00

This offer is based on the documentation provided. If major changings occure, a new proposal may have to be done.

Payment conditions: a 30% account is demanded when ordering. Remaining amount to be paid when all parts are delivered, and accepted.

Leadtime: please refer to the proposed schedule.

WORKSHAPE, SARL au capital de 50 000 euro, APE 7112b

N° SIRET: 49501024100018, N° TVA: FR20495010241

- The ladder assembly mass production is moving smoothly close to the end (end of October/beginning of November) but unfortunately lack of funding to purchase the 18 sets of silicon sensors will cause some delays.

- BNL INTT project account was closed on October 1st, due to a lack of funding 2020/2021.

- **Original schedule of INTT is:**

- One half INTT barrels ready by January 2022
- Second half of INTT barrels ready by June 2022
- Survey
- Barrels Testing for cross talks/debugging
- Putting the two halves INTT together (mechanical interferences)

} July/August/September 2022

- **Disaster idea came up recently as a solution for lack of funding:** pushing INTT mass production components to next Japanese Fiscal Year 2022 (starting April 1st 2022) is a disaster for INTT.

The INTT Detector will not be ready on September 2022, impossible to assemble barrels without these components:

- Extender Bus
- CFC support structure
- Conversion cables

Urgent funding solution is needed

