Appendix C
Task 3 "Clean Fuel" Results

MODE 1 RESULTS																	
FUEL NAME	RUN	PHI	A/Fs	O_2%	CO_2%	CO PPM	NO_X PPM	HC PPM	BSCO	$BSNO_X$	$BSNO_X$ CORR	BSHC	BHP	SMOKE	DURATION	P_{MAX}	Q_{TOT}
Base	760	0.513	14.503	10.730	7.610	506.000	754.000	636.000	2.683	6.566	5.855	1.778	5.900	2.000	34.200	882.000	1.047
FT2 Feed	765	0.522	14.787	10.590	7.550	459.400	830.900	513.000	2.363	7.020	6.271	1.421	6.200	0.500	33.000	942.000	1.061
FT2 Frac 1	770	0.526	14.773	10.570	7.560	358.700	783.100	1100.000	1.825	6.543	5.858	3.008	6.300	0.400	34.800	890.400	1.079
FT2 Frac 2	776	0.533	14.857	10.460	7.580	353.600	557.000	1237.000	1.941	5.023	4.510	3.674	5.900	1.600	46.200	940.300	1.070
FT2 Frac 3	777	0.525	14.801	10.560	7.530	392.800	704.600	901.000	1.960	5.776	5.174	2.422	6.500	0.800	36.000	916.800	1.132
FT2 Frac 4	780	0.520	14.829	10.660	7.500	280.000	846.300	678.000	1.439	7.142	6.369	1.880	6.300	0.000	34.800	947.000	1.069
FT2 Frac 5	785	0.515	14.731	10.660	7.450	510.300	695.300	408.000	2.741	6.133	5.479	1.174	6.000	2.400	37.800	953.000	1.045
FT2 Frac 6	790	0.514	14.731	10.670	7.430	530.000	703.000	354.000	2.800	6.101	5.431	1.002	6.100	2.600	39.000	963.000	1.041
FT2 Frac 7	795	0.515	14.773	10.630	7.380	773.000	629.800	333.000	4.308	5.765	5.114	0.997	5.800	3.000	40.200	945.000	1.027
FT1 Frac 1	815	0.533	15.036	10.320	7.390	628.000	702.900	672.000	3.485	6.407	5.738	2.043	5.800	2.800	41.400	1048.000	1.055
FT1 Frac 2	820	0.539	15.050	10.170	7.510	540.000	733.200	537.000	2.931	6.537	5.862	1.601	5.900	2.700	41.400	1057.000	1.055
FT1 Frac 3	825	0.534	15.009	10.250	7.460	711.000	654.300	337.000	3.831	5.792	5.189	0.994	6.000	2.700	42.600	1028.000	1.064
FT1 Frac 4	830	0.528	14.954	10.330	7.370	802.000	696.100	364.000	5.308	7.568	6.754	1.312	4.900	2.800	42.600	1046.000	1.028
FT1 Frac 5	835	0.524	14.995	10.540	7.390	579.000	582.100	381.000	3.342	5.519	4.914	1.202	5.600	2.300	39.600	939.000	1.013
FT1 Frac 6	840	0.526	14.926	10.530	7.470	785.000	576.000	379.000	4.317	5.203	4.642	1.134	5.800	3.000	63.600	943.000	4.700
FT1 Frac 7	845	0.530	14.995	10.400	7.430	855.000	548.000	347.000	4.629	4.874	4.345	1.027	5.900	3.200	42.000	947.000	1.043
CF10	860	0.516	14.703	10.640	7.520	440.600	601.000	308.000	2.386	5.354	4.777	0.893	5.900	2.300	0.000	930.000	0.000
CF1	865	0.522	14.815	10.520	7.490	537.700	590.800	395.000	2.940	5.306	4.739	1.165	5.900	2.700	42.000	934.000	1.032
CF2	870	0.518	14.703	10.580	7.480	668.800	566.700	465.000	3.811	5.304	4.727	1.417	5.700	3.200	42.600	905.000	1.005
CF3	875	0.525	14.968	10.480	7.380	639.000	623.000	493.000	3.487	5.585	4.980	1.467	5.900	2.800	0.000	950.800	0.000
CF9	880	0.514	14.773	10.700	7.450	486.000	506.000	312.000	2.885	4.934	4.367	0.996	5.400	2.400	45.600	858.900	1.035
CF7	885	0.518	14.773	10.620	7.460	562.000	533.000	416.000	3.185	4.962	4.429	1.267	5.700	3.300	42.600	925.000	1.030
CF4	890	0.522	14.603	10.450	7.660	615.000	532.000	257.000	3.494	4.964	4.428	0.776	5.700	2.800	43.800	899.000	1.040
CF5	895	0.526	14.787	10.410	7.550	680.000	543.000	320.000	3.769	4.944	4.402	0.955	5.800	2.800	40.800	914.000	1.053
CF6	900	0.511	14.575	10.720	7.460	726.000	513.000	579.000	4.197	4.871	4.330	1.772	5.600	2.600	44.400	889.000	1.011
CF8	905	0.515	14.674	10.660	7.470	614.000	525.000	440.000	3.485	4.895	4.379	1.332	5.700	2.400	44.400	879.000	1.016

MODE 2 RESULTS

FUEL NAME	RUN	PHI	A/Fs	O_2%	CO_2%	CO PPM	NO_x PPM	HC PPM	BSCO	$BSNO_x$	$BSNO_x$ CORR	BSHC	BHP	SMOKE	DURATION	P_{MAX}	Q_{TOT}
Base	761	0.504	14.503	10.860	7.520	371.900	856.100	355.000	1.981	7.490	6.665	0.996	6.027	0.800	33.600	963.468	1.038
FT2 Feed	766	0.520	14.787	10.600	7.540	428.000	833.300	388.000	2.220	7.098	6.339	1.083	6.151	0.600	33.600	942.497	1.059
FT2 Frac 1	771	0.511	14.773	10.850	7.290	300.800	793.200	1161.000	1.646	7.128	6.353	3.406	5.879	0.200	34.800	856.998	0.942
FT2 Frac 2	775	0.527	14.857	10.590	7.480	345.700	424.700	1269.000	1.948	3.931	3.525	3.865	5.800	1.200	46.200	821.300	1.066
FT2 Frac 4	781	0.524	14.829	10.510	7.600	271.100	820.000	354.000	1.382	6.867	6.130	0.975	6.334	0.400	35.400	911.962	1.090
FT2 Frac 5	786	0.515	14.731	10.650	7.450	483.000	621.000	401.000	2.618	5.529	4.934	1.164	5.938	2.200	38.400	918.539	1.043
FT2 Frac 6	791	0.515	14.731	10.640	7.450	570.400	650.600	354.000	3.017	5.653	5.028	1.003	6.091	2.100	37.200	931.396	1.046
FT2 Frac 7	796	0.517	14.773	10.590	7.400	798.300	571.800	337.000	4.410	5.189	4.616	1.000	5.854	2.800	42.600	906.588	1.025
Base	801	0.511	14.503	10.630	7.510	596.500	653.900	385.000	3.298	5.939	5.304	1.122	5.950	2.600	37.800	954.523	1.028
FT1 Feed	811	0.521	14.575	10.510	7.670	346.200	616.700	569.000	2.012	5.887	5.273	1.754	5.584	2.800	39.600	934.680	1.041
FT1 Frac 1	816	0.528	15.036	10.430	7.340	535.400	514.600	652.000	3.013	4.757	4.252	2.009	5.714	2.800	41.400	881.568	1.054
FT1 Frac 2	821	0.530	15.050	10.350	7.390	385.700	519.000	439.000	2.134	4.718	4.218	1.333	5.808	2.200	41.400	884.964	1.064
FT1 Frac 3	826	0.543	15.009	10.070	7.590	684.100	511.000	396.000	3.669	4.502	4.038	1.164	6.016	2.800	44.400	886.872	1.085
FT1 Frac 4	831	0.523	14.954	10.430	7.330	549.800	504.800	397.000	3.082	4.648	4.143	1.211	5.792	2.600	90.600	905.401	4.932
FT1 Frac 5	836	0.524	14.995	10.550	7.400	612.600	525.000	356.000	3.456	4.865	4.332	1.097	5.721	2.600	41.400	911.750	1.043
FT1 Frac 6	841	0.531	14.926	10.420	7.530	900.100	527.400	390.000	5.064	4.874	4.353	1.194	5.676	3.400	43.200	904.623	1.047
FT1 Frac 7	846	0.527	14.995	10.440	7.360	873.400	509.200	381.000	4.861	4.655	4.148	1.158	5.762	3.200	88.800	922.433	0.725
DF-2	851	0.515	14.646	10.600	7.500	429.600	588.800	371.000	2.357	5.306	4.743	1.084	5.913	2.300	37.800	937.944	1.037
DF-2	856	0.512	14.603	10.760	7.500	533.200	645.700	599.000	2.982	5.931	5.306	1.778	5.778	2.600	38.400	972.825	1.010
CF10	861	0.515	14.703	10.650	7.510	422.900	583.100	279.000	2.301	5.210	4.651	0.812	5.904	2.300	75.600	931.776	7.178
CF1	866	0.521	14.815	10.510	7.470	518.700	540.300	326.000	2.842	4.863	4.343	0.963	5.899	2.700	4.800	900.304	-3.065
CF2	871	0.523	14.703	10.470	7.580	501.700	582.700	389.000	2.737	5.222	4.659	1.136	5.922	3.000	41.400	934.399	1.031
CF3	876	0.526	14.968	10.460	7.410	438.400	564.200	544.000	2.398	5.070	4.522	1.622	5.886	2.400	84.000	210.704	0.000
CF9	881	0.519	14.773	10.620	7.520	516.000	540.600	274.000	2.954	5.084	4.534	0.844	5.584	2.800	42.000	902.331	1.026
CF7	886	0.524	14.773	10.480	7.550	640.400	547.700	346.000	3.519	4.944	4.419	1.023	5.874	2.800	0.000	907.195	-0.075
CF4	891	0.520	14.603	10.500	7.650	570.900	566.000	239.000	3.195	5.204	4.640	0.711	5.767	2.600	89.400	938.101	0.578
CF5	896	0.526	14.787	10.380	7.550	635.100	543.700	293.000	3.531	4.966	4.422	0.877	5.781	2.700	84.000	128.816	0.000
CF6	901	0.512	14.575	10.700	7.490	716.400	589.800	517.000	4.050	5.477	4.875	1.548	5.717	3.300	40.800	984.253	0.998
CF8	906	0.515	14.674	10.650	7.460	698.400	545.100	390.000	4.015	5.147	4.605	1.196	5.639	3.100	39.600	939.770	1.021

MODE 3 RESULTS																	
FUEL NAME	RUN	PHI	A/Fs	O_2%	CO_2%	CO PPM	NO_x PPM	HC PPM	BSCO	$BSNO_x$	$BSNO_x$ CORR	BSHC	BHP	SMOKE	DURATION	P_{MAX}	Q_{TOT}
Base	762	0.507	14.503	10.840	7.540	337.800	880.800	567.000	1.771	7.584	6.752	1.566	8.830	0.500	34.200	1029.189	1.241
FT2 Feed	767	0.514	14.787	10.720	7.460	272.700	967.700	482.000	1.352	7.878	7.003	1.285	9.250	0.200	33.000	1076.011	1.262
FT2 Frac 1	772	0.517	14.773	10.700	7.410	314.600	621.400	954.000	1.683	5.461	4.863	2.740	8.750	0.400	42.600	957.290	1.226
FT2 Frac 3	777	0.525	14.801	10.560	7.530	392.800	704.600	901.000	1.970	5.803	5.198	2.434	6.470	0.800	36.000	916.841	1.132
FT2 Frac 4	782	0.527	14.829	10.500	7.600	437.700	761.400	502.000	2.194	6.270	5.594	1.360	9.060	1.800	39.600	1061.803	1.262
FT2 Frac 5	787	0.514	14.731	10.680	7.440	446.700	704.400	478.000	2.332	6.041	5.384	1.337	8.900	1.900	39.000	1049.678	1.241
FT2 Frac 6	792	0.511	14.731	10.710	7.400	457.700	688.600	357.000	2.436	6.020	5.338	1.018	8.700	2.200	42.000	1039.316	1.232
FT2 Frac 7	797	0.514	14.773	10.640	7.390	457.400	666.900	305.000	2.484	5.949	5.276	0.890	8.560	2.000	42.600	1048.752	1.242
Base	802	0.512	14.503	10.650	7.540	509.000	668.900	479.000	2.795	6.034	5.367	1.386	8.540	2.200	42.000	1039.855	1.224
FT2 Frac 2	805	0.530	14.857	10.470	7.590	404.300	655.000	774.000	2.078	5.529	4.930	2.153	8.940	3.000	41.400	1045.741	1.307
FT1 Feed	812	0.510	14.575	10.760	7.500	372.700	650.100	597.000	2.271	6.507	5.808	1.927	7.600	2.300	40.800	1037.341	1.227
FT1 Frac 1	817	0.538	15.036	10.190	7.530	343.600	659.000	549.000	1.950	6.142	5.485	1.709	8.090	2.000	42.600	1044.228	1.296
FT1 Frac 2	822	0.534	15.050	10.250	7.450	304.900	609.700	471.000	1.741	5.718	5.100	1.476	8.160	2.000	43.200	1027.330	1.304
FT1 Frac 3	827	0.540	15.009	10.120	7.580	417.000	634.200	379.000	2.318	5.792	5.175	1.154	8.330	2.200	43.200	1043.307	1.297
FT1 Frac 4	832	0.530	14.954	10.270	7.450	405.300	596.300	340.000	2.259	5.460	4.859	1.033	8.370	2.000	42.600	1037.657	1.271
FT1 Frac 5	837	0.521	14.995	10.600	7.390	394.400	581.200	343.000	2.229	5.395	4.811	1.059	8.130	2.200	43.800	1026.419	1.245
FT1 Frac 6	842	0.529	14.926	10.430	7.550	526.400	581.000	311.000	2.972	5.388	4.815	0.956	8.140	2.400	43.800	1032.494	1.281
FT1 Frac 7	847	0.521	14.995	10.540	7.360	466.700	592.000	278.000	2.622	5.464	4.878	0.853	8.230	2.000	42.600	1055.064	1.271
DF-2	852	0.521	14.646	10.490	7.590	327.700	598.600	466.000	1.864	5.592	5.010	1.412	8.220	2.200	4.800	1000.706	-4.091
DF-2	857	0.519	14.603	10.600	7.660	273.100	732.900	516.000	1.505	6.634	5.950	1.511	8.340	1.500	39.000	1064.515	1.236
CF10	862	0.514	14.703	10.660	7.510	294.100	640.800	307.000	1.673	5.989	5.350	0.934	8.140	1.700	40.800	1031.748	1.225
CF1	867	0.518	14.815	10.590	7.450	340.600	615.500	347.000	1.913	5.680	5.074	1.051	8.220	2.000	42.600	1023.005	1.224
CF2	872	0.517	14.703	10.590	7.500	362.500	594.500	408.000	2.113	5.691	5.076	1.272	8.010	2.000	42.000	1025.084	1.209
CF3	877	0.524	14.968	10.480	7.400	359.200	593.300	421.000	2.001	5.430	4.851	1.279	8.300	1.700	84.000	134.095	0.000
CF9	882	0.513	14.773	10.740	7.460	304.800	563.800	305.000	1.838	5.585	4.986	0.989	7.640	1.600	45.000	979.285	1.222
CF7	887	0.517	14.773	10.620	7.470	448.600	553.200	335.000	2.522	5.109	4.565	1.012	8.280	2.100	0.000	964.441	-7.541
CF4	892	0.519	14.603	10.510	7.650	341.100	620.000	260.000	1.930	5.762	5.142	0.782	8.230	2.000	45.000	1018.340	1.243
CF5	897	0.519	14.787	10.540	7.470	405.000	540.100	267.000	2.306	5.051	4.499	0.818	8.140	2.400	0.600	973.420	-3.935
CF6	902	0.512	14.575	10.680	7.540	340.100	561.900	398.000	1.961	5.323	4.752	1.216	8.060	2.100	48.000	987.534	2.276

MODE 4 RESULTS

FUEL NUMBER	RUN	PHI	A/Fs	O_2%	CO_2%	CO PPM	NO_X PPM	HC PPM	BSCO	$BSNO_X$	$BSNO_X$ CORR	BSHC	BHP	SMOKE	DURATION	P_{MAX}	Q_{TOT}
Base	763	0.357	14.503	13.920	5.260	214.600	477.500	351.000	1.763	6.445	5.542	1.491	5.760	0.000	33.000	953.774	0.898
FT2 Feed	768	0.368	14.787	13.740	5.240	215.300	490.800	435.000	1.815	6.796	5.848	1.932	5.060	0.100	31.200	880.864	0.820
FT2 Frac 1	773	0.365	14.773	13.850	5.120	237.000	344.900	1046.000	2.110	5.044	4.329	4.893	4.850	0.100	87.600	580.802	4.312
FT2 Frac 3	778	0.517	14.801	10.710	7.360	562.600	638.400	893.000	3.002	5.595	4.981	2.563	8.770	0.800	38.400	976.051	1.242
FT2 Frac 4	783	0.368	14.829	13.770	5.230	232.900	469.600	468.000	1.973	6.533	5.610	2.094	5.050	0.600	35.400	930.208	0.822
FT2 Frac 5	788	0.367	14.731	13.730	5.250	228.800	434.800	371.000	1.931	6.028	5.188	1.644	5.070	0.800	35.400	905.965	0.815
FT2 Frac 6	793	0.360	14.731	13.790	5.170	198.100	446.400	172.000	3.515	13.010	11.157	1.601	2.420	0.300	36.000	902.273	0.806
FT2 Frac 7	798	0.370	14.773	13.540	5.280	200.300	446.900	149.000	1.598	5.855	5.021	0.626	5.380	0.800	36.000	910.132	0.827
Base	803	0.362	14.503	13.760	5.280	217.700	438.900	481.000	1.886	6.246	5.366	2.154	4.990	1.000	36.000	913.172	0.818
FT2 Frac 2	806	0.371	14.857	13.790	5.180	196.900	428.800	1072.000	1.643	5.879	5.040	4.731	5.170	0.200	55.800	943.377	3.226
FT1 Feed	813	0.363	14.575	13.790	5.270	253.400	391.000	486.000	2.270	5.754	4.952	2.261	4.810	1.300	36.000	907.612	0.797
FT1 Frac 1	818	0.375	15.036	13.560	5.150	185.800	437.700	660.000	1.539	5.957	5.118	2.928	5.180	0.700	34.800	923.218	0.838
FT1 Frac 2	823	0.375	15.050	13.510	5.160	190.500	393.600	418.000	1.556	5.281	4.545	1.830	5.300	0.600	35.400	910.339	0.845
FT1 Frac 3	828	0.377	15.009	13.450	5.240	175.300	439.400	211.000	1.381	5.687	4.889	0.890	5.450	1.900	35.400	915.674	0.850
FT1 Frac 4	833	0.371	14.954	13.530	5.170	193.500	404.300	163.000	1.586	5.444	4.664	0.712	5.290	1.800	35.400	906.126	0.830
FT1 Frac 5	838	0.524	14.995	10.540	7.390	578.600	582.100	381.000	4.653	7.689	6.854	1.674	5.250	0.900	36.000	902.089	0.841
FT1 Frac 6	843	0.369	14.926	13.750	5.220	209.000	390.000	180.000	1.734	5.314	4.581	0.794	5.150	1.000	36.600	901.002	0.838
FT1 Frac 7	848	0.369	14.995	13.650	5.150	193.800	378.700	161.000	1.612	5.174	4.468	0.715	5.180	0.900	34.800	907.020	0.830
DF-2	853	0.365	14.646	13.710	5.260	199.600	384.600	345.000	1.699	5.376	4.646	1.532	5.070	0.800	34.200	891.008	0.813
DF-2	858	0.363	14.603	13.810	5.270	248.200	448.000	438.000	2.146	6.362	5.509	1.971	4.960	1.000	33.600	944.336	0.801
CF10	863	0.361	14.703	13.830	5.200	210.400	406.700	246.000	1.824	5.792	5.000	1.117	4.970	0.800	4.200	898.388	-2.797
CF1	868	0.366	14.815	13.700	5.190	208.100	401.400	259.000	1.794	5.684	4.899	1.178	4.990	0.800	68.400	895.281	0.330
CF2	873	0.367	14.703	13.680	5.260	219.600	418.000	328.000	1.888	5.903	5.071	1.477	4.990	1.000	90.600	912.291	5.785
CF3	878	0.376	14.968	13.530	5.240	197.400	423.900	419.000	1.621	5.719	4.946	1.836	5.230	0.600	0.000	814.281	-2.326
CF9	883	0.368	14.773	13.740	5.290	189.200	373.800	154.000	1.623	5.268	4.543	0.696	4.990	0.800	46.200	859.577	0.672
CF7	888	0.370	14.773	13.630	5.280	203.000	373.500	243.000	1.744	5.270	4.547	1.099	5.010	1.100	39.000	881.399	0.822
CF4	893	0.357	14.603	13.820	5.200	202.100	392.700	132.000	1.795	5.730	4.914	0.610	4.870	1.000	45.000	887.989	1.516
CF5	898	0.367	14.787	13.650	5.240	212.300	368.800	157.000	1.828	5.216	4.479	0.712	5.000	1.400	39.600	872.355	0.820
CF6	903	0.363	14.575	13.760	5.260	267.300	361.600	428.000	2.420	5.377	4.647	2.012	4.770	1.200	40.200	881.906	0.800

of the Higgs field. This means that, while for instance for the bottom quark, the second heaviest fermion, G_{bottom} is only ~ 0.03, G_{top} is large. For the particular value $M_{top} = 174$ GeV/c^2, $G_{top} = 1.00$! Is this telling us something?

Hill and Parke [13], and Eichten and Lane [14] have used the fact that the top quark is so massive to point out that it may turn out to be a powerful probe of electroweak symmetry breaking physics. This was reported by K. Lane in a mini-review at this conference [15]. They suggest in particular that new states may exist, strongly coupled to the top, and that non-standard model, resonant $t\bar{t}$ production via such states, if they exist, could be observed with rather modest statistics. The $t\bar{t}$ invariant mass distribution could be particularly revealing. Any such observation of physics beyond the standard model would be highly interesting!

The measurement of the top quark mass to good precision is also important, both in its own right, and because of the light it may shed, together with a precision M_W measurement, on the Higgs mass. It can be seen from Figure 14 that there is as yet no constraint on the Higgs mass from the current knowledge of (M_{top} , M_W). Expected improvements in the measurement of both these quantities during the remainder of this decade, to perhaps ± 5 GeV/c^2 for M_{top} and ± 50 MeV/c^2 for M_W, could put the standard model to the test, however.

With more statistics, the full subject of top physics will begin to unfold. It may turn out to be even more interesting than that of its sister particle, the b quark!

12. Acknowledgements

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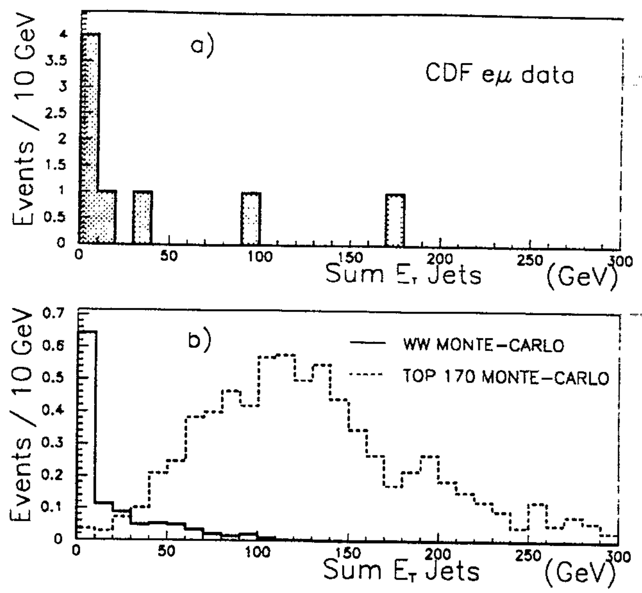

Figure 15. a) The Sum of E_T(jet), ΣE_T(jet) , for the 8 $e\mu$ events passing the $P_T > 20$ GeV/c requirement on each lepton. Only jets with $E_T > 10$ GeV and $|\eta| < 2.4$ are included in the sum. The two events in the signal region of the dilepton analysis are the two events with the highest ΣE_T(jet) . The six events at low ΣE_T(jet) fail both the two-jet cut and the $\not{E}_T$ cut. b) Monte Carlo ΣE_T(jet) distribution for $t\bar{t}$ production ($M_{top} = 170$ GeV/c^2), and for electroweak WW production, one of the backgrounds to the top search. The histogram for WW production is normalized to 19.3 pb^{-1} , the same as the data, while the $t\bar{t}$ histogram has an exaggerated normalization of 150 pb^{-1} to show more clearly the shape of the distribution. Note that the six events at low sum E_T in a) are unlikely to be mostly WW since they have low $\not{E}_T$.

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K. Hidaka, Tokyo Gakugei University:
What is the definition of the top mass?

H. Jensen:
The top mass is determined for each event by a fit to the final state lepton and jet energies, using the hypothesis $p\bar{p} \to t\bar{t} \to WbW\bar{b}$.

K. Hidaka, Tokyo Gakugei University:
Do you have any information on the width of the top

Table 6.2 CSASIN sample problem files

File name	
SAMPLE2.ARR	Sample Problem 2
SAMPLE2.BIA	
SAMPLE2.BND	
SAMPLE2.GEO	
SAMPLE2.IN	
SAMPLE2.LAT	
SAMPLE2.MIP	
SAMPLE2.PAR	
SAMPLE2.SEA	
SAMPLE2.STD	
SAMPLE3.ARR	Sample Problem 3
SAMPLE3.BIA	
SAMPLE3.GEO	
SAMPLE3.IN	
SAMPLE3.LAT	
SAMPLE3.MIP	
SAMPLE3.PAR	
SAMPLE3.SEA	
SAMPLE3.STD	