1 Different Greedy Methods- I Named them results based on folder

(Note:2 exponents are redundant if they're similar to the third decimal place, default factor is 2.)
results - exits if number of functions is 30 or KL-Divergence is less than $1e-6$ or redundancies are found or the next set of choices for n+1 basis functions is not better than current n basis functions.
results_original - same as results except completely Ignores if redundancies occurred but it does record that it did find them.
THe point of this method was to see if "one can get out of being redudant if we ignore their presence". Answer is no.
results_redundancies - same as results except if redundancies are found and they have better error (KL diverg.) then it reverts back to the smaller/condensed parameters. If not, it goes back to n basis function and tries again with a new factor. If redundancies are found 5 times in a row, it exits.
The point of this method was to see if "changing the factor gives different answer" and "use redudancies to refine our parameters and continue greedy from that "condensed" parameters".

2 How each Element Exited Based on Method

No method exited because it reached 30 basis functions or because it found five redundancies in a row.

results - Format: element name (number of basis functions)-
Exited because Redudandcies Were Found: he(8), li(8), b(13), be(11), c(10).
Exited because objective function was small: n(10), o(8), f(8), ne (8).

results_original -
Exited because next n+1 basis func was not better: he(13), li(10), be(12), b(14), c(21)
Exited because objective function was small: n(10), o(8), f(8), ne(8).

results_redundancies -
Exited because next n+1 basis func was not better: he(7), li(8), be(9), b(10), c(20)
Exited because objective function was small: n(10), o(8), f(8), ne(8).
Exited because 5 redudancies were found in a row : None $\Rightarrow$having an adaptive factor here is useless

General Conclusion is small elements tend to exit by not finding better choices and converges mostly around 8 functions.

3 Redundancies Information Format: Element(Numb.of Basis Functions, Numb. after removing redundancy)

results- Note:exits if redun. He(8, 7), Li(8, 7), Be(11, 8), B(13, 8), C(10, 9). Rest of elements no redundancies were found.

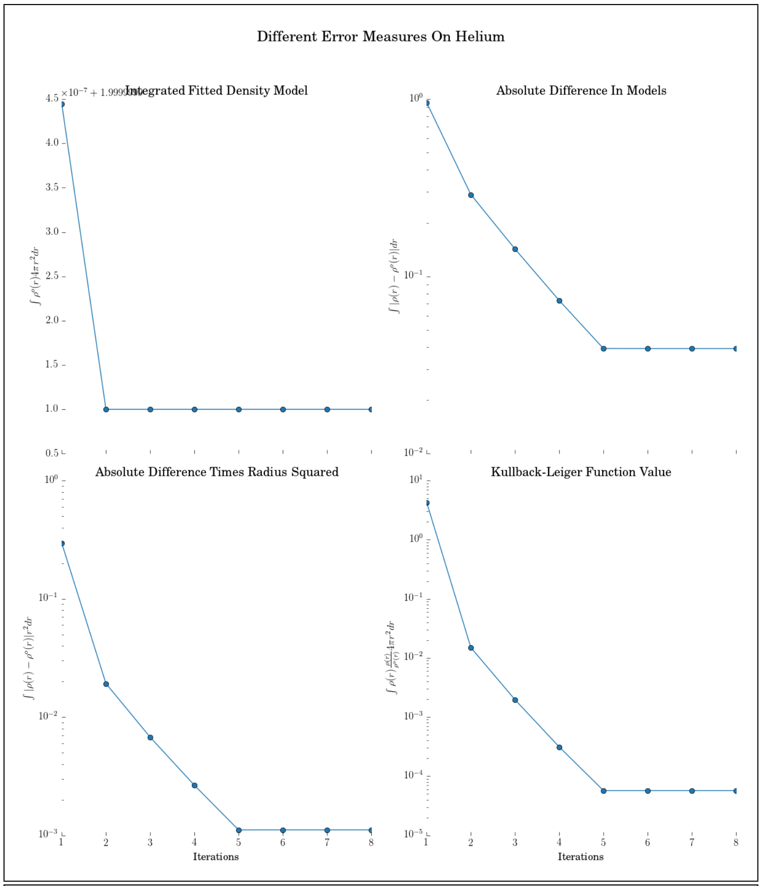
result_original Note: this method only records that redudancies occured
- He[[8, 7], [9, 7], [10, 7], [11, 7], [12, 7], [13, 7]]. Here the number of redudant exponents in each iteration is inc. by one.
Below we see that the number of redundancies is constant throughout
Li [[8, 7], [9, 8], [10, 9]].
Be[[11, 8], [12, 9]]
B [[13, 8], [14, 9]]
C[[10, 9], [11, 10], [12, 11], [13, 12], [14, 13], [15, 14], [16, 15], [17, 16], [18, 17], [19, 18], [20, 19], [21, 20]].

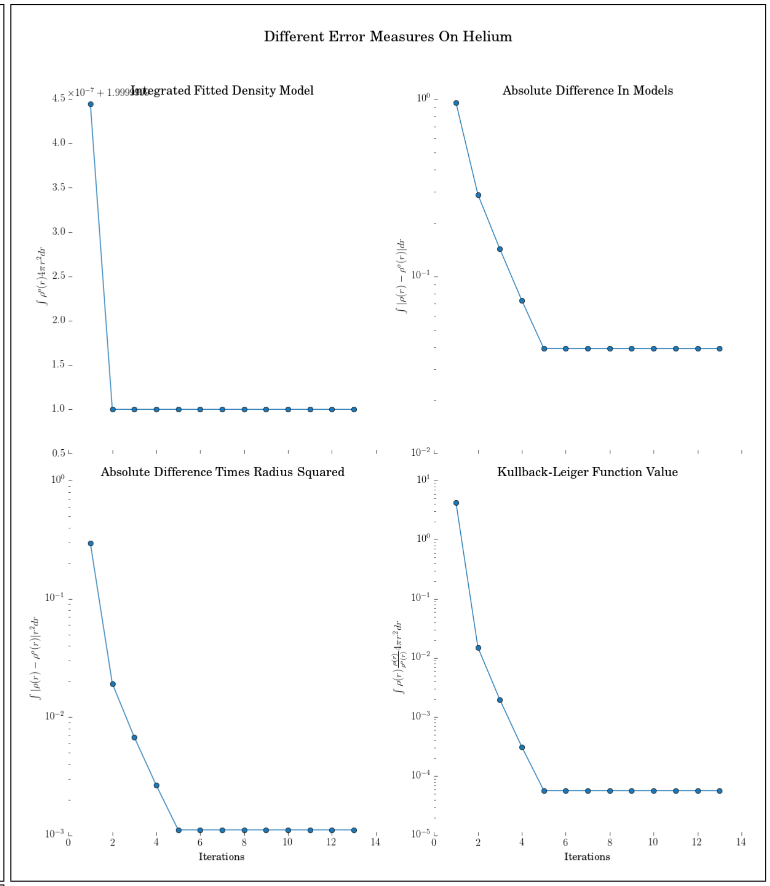
result_redudancies He[[8, 7, 'Gave Better Answer']], Note: Finished right after removing redund. i.e. 7 basis func
Li[[8, 7, 'Gave Better Answer']] Note:finished at 8 basis func.
Be[[11, 8, 'Gave Better Answer']] Note:finished at 9 basis func.
B[[13, 8, 'Gave Better Answer']] Note: finished at 10
C[[10, 9, 'Gave Better Answer']] Note: Carbon finished with 20 basis func.

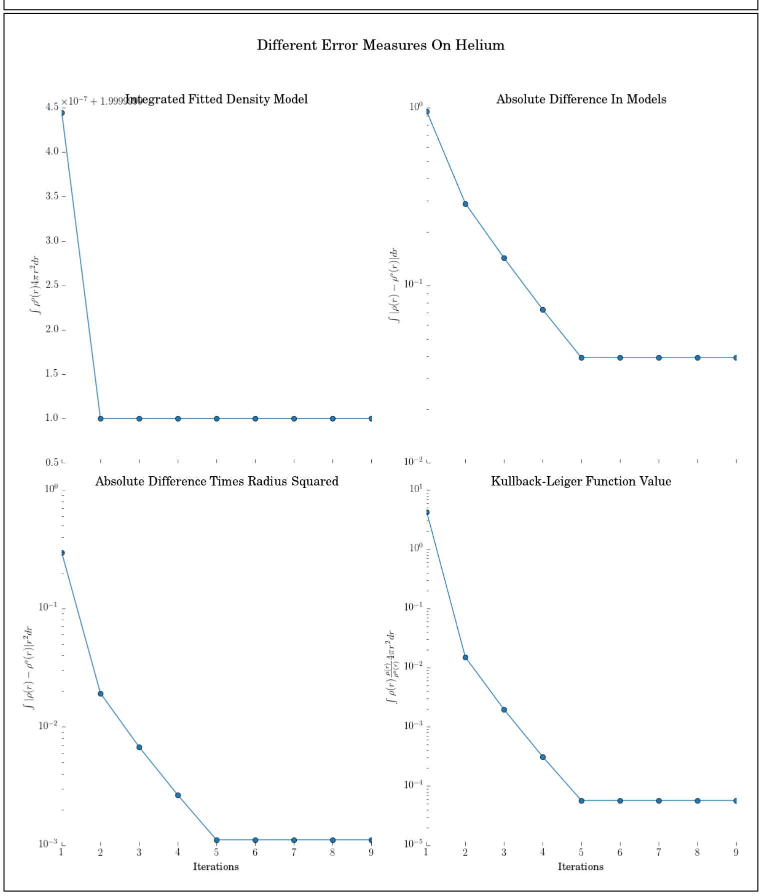
Conclusion: Even though result_redudancies found/removed redundant exponents it still gave a lower error overall, hence my adaptive factor idea is useless here. It appears that removing redudancy is a better choice then ignoring them, as once they're removed they never show up again, however exiting when redundacy were found seems to be the best choice as error does not dec. greatly (look at plots below), or even exiting when the change in obj function is small (Counter example is Nit. as it had a slightly dec. in error). Ultimately, this shows that global optimum at each iteration is not guranteed and caring about redundacy is pretty much pointless, as seen by comparing the change in error from plots.

4 Plotting Elements Side by Side, (Results, Results-O, Results-R)

4.1 HE







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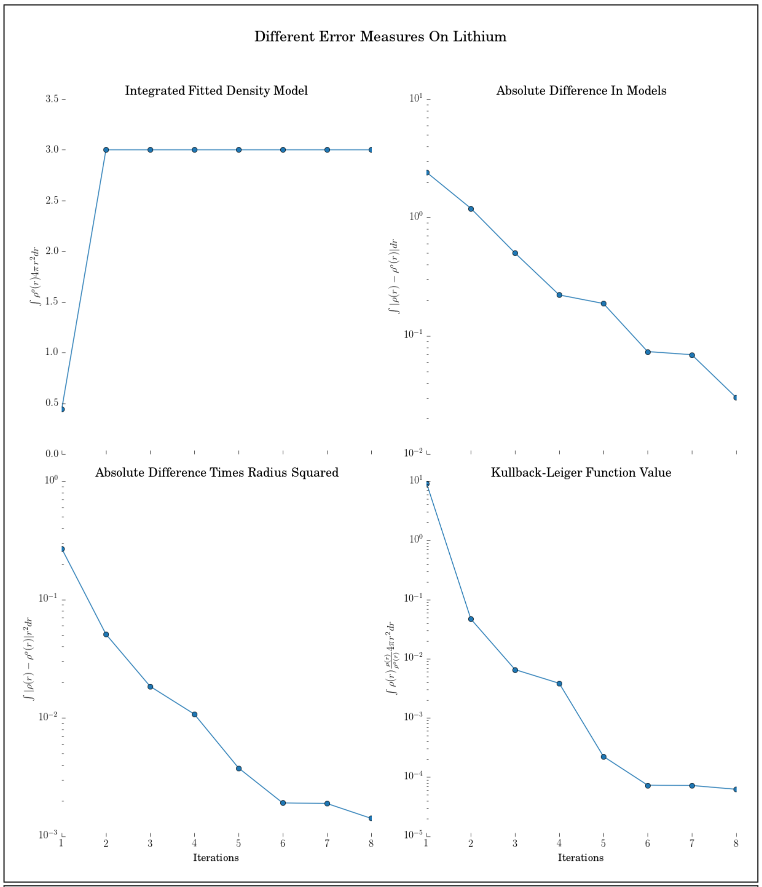
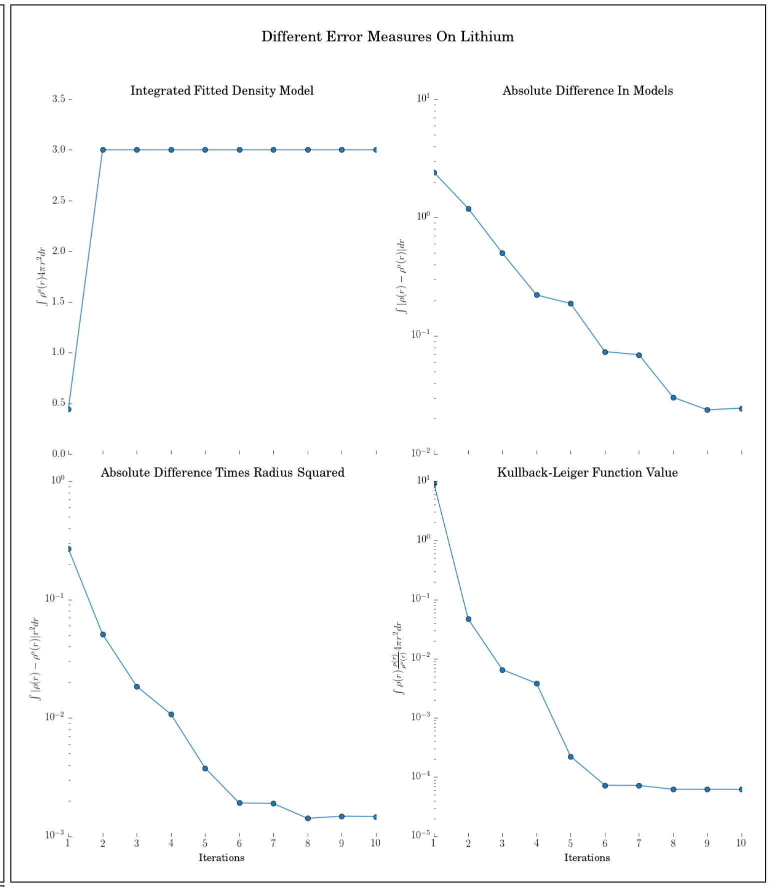
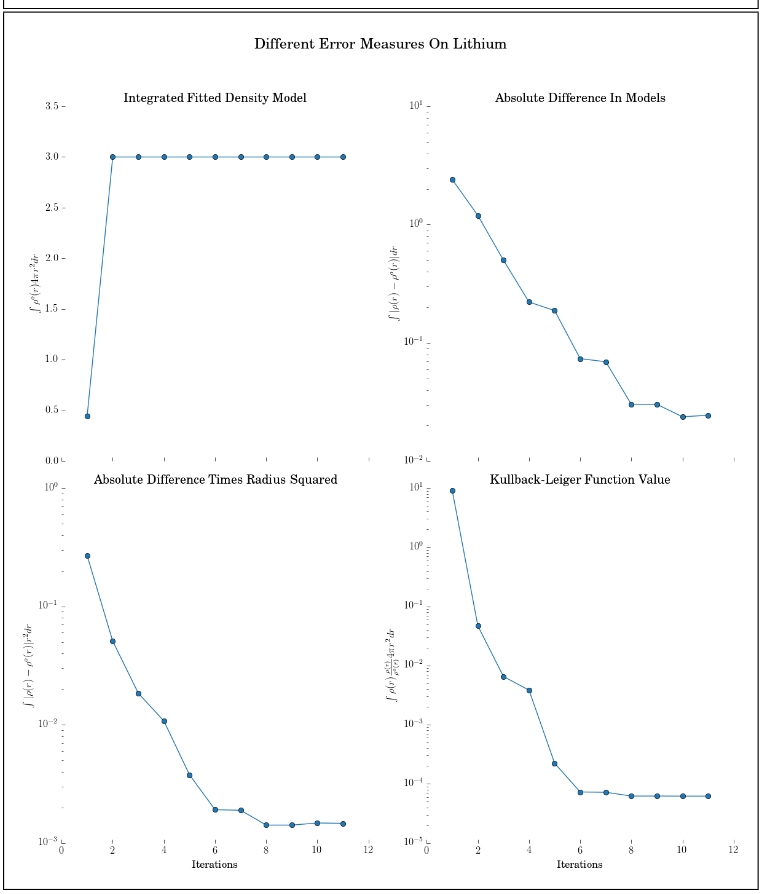


Different Error Measures On Lithium
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations



Different Error Measures On Lithium
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations



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Absolute Difference In Models
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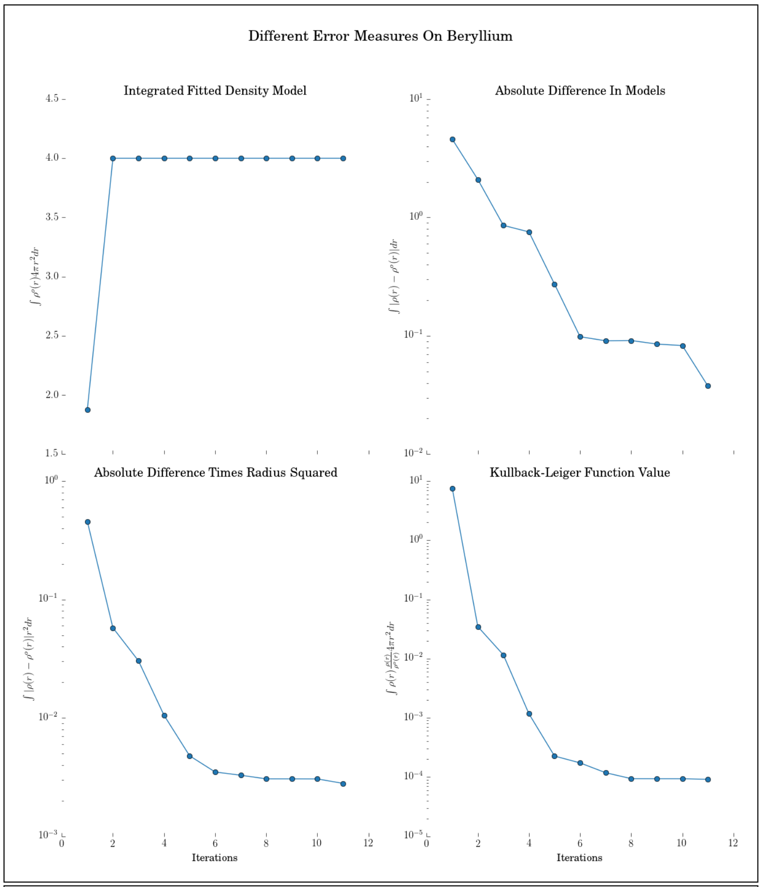
Kullback-Leiger Function Value
Iterations
Iterations

4.3 Be


Different Error Measures On Beryllium
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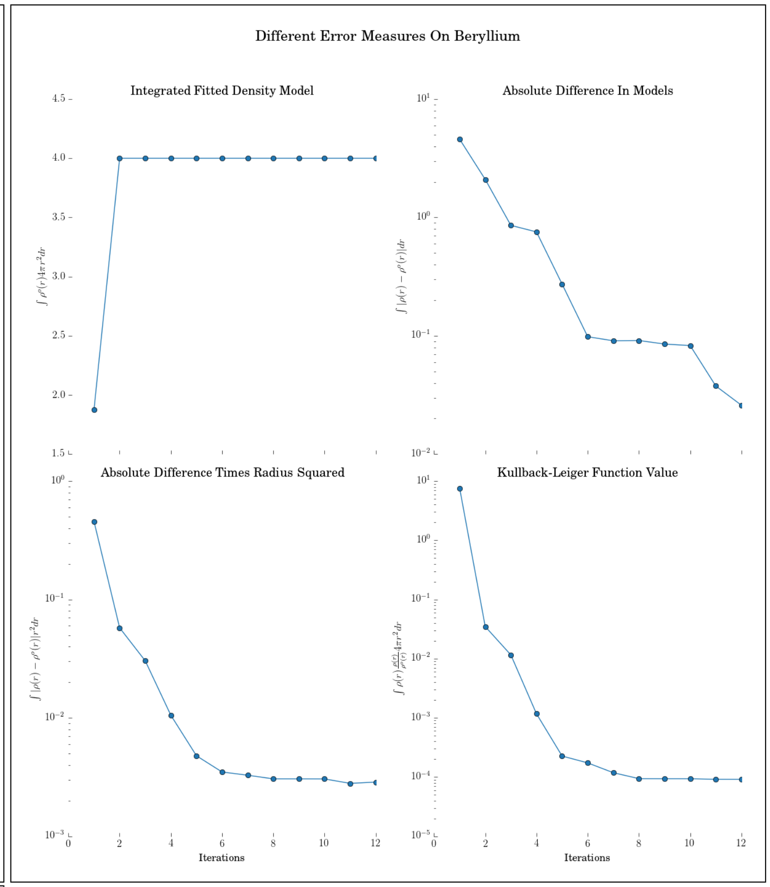
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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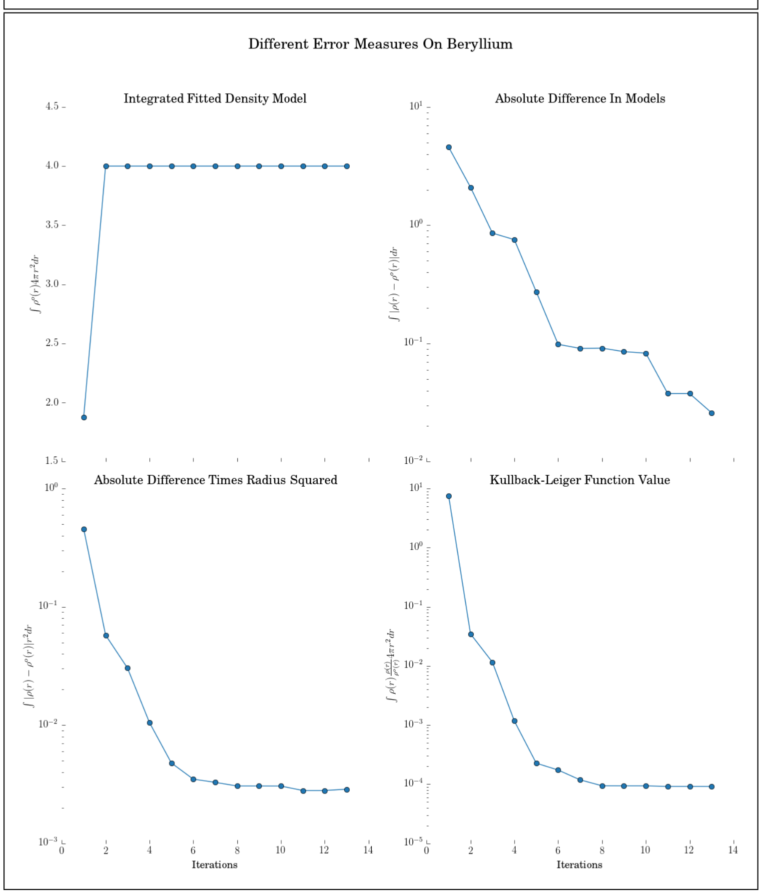
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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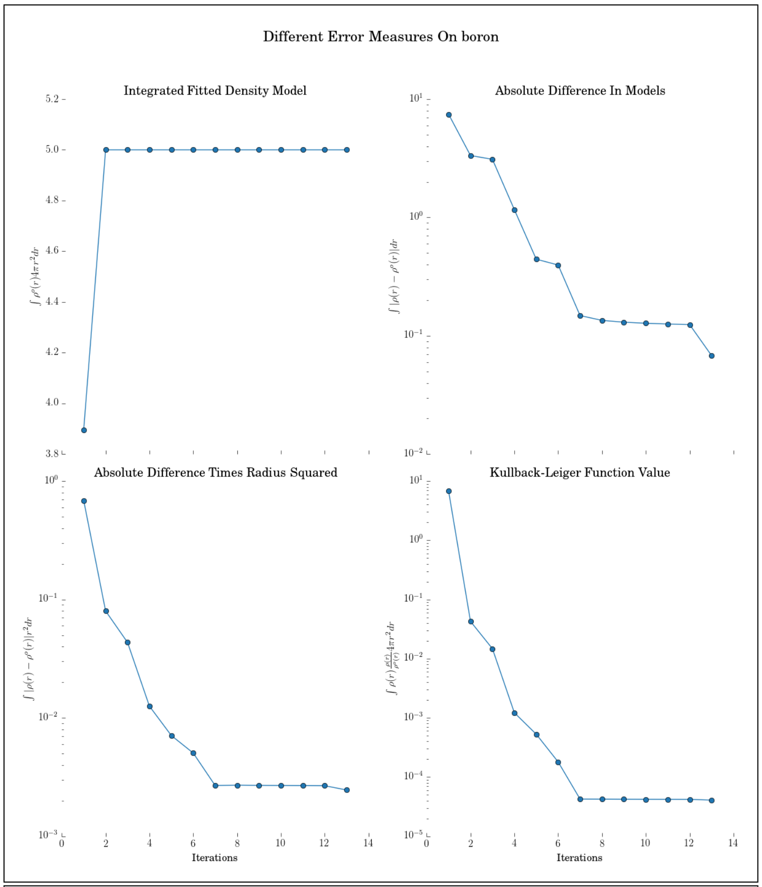
Kullback-Leiger Function Value
Iterations
Iterations

4.4 b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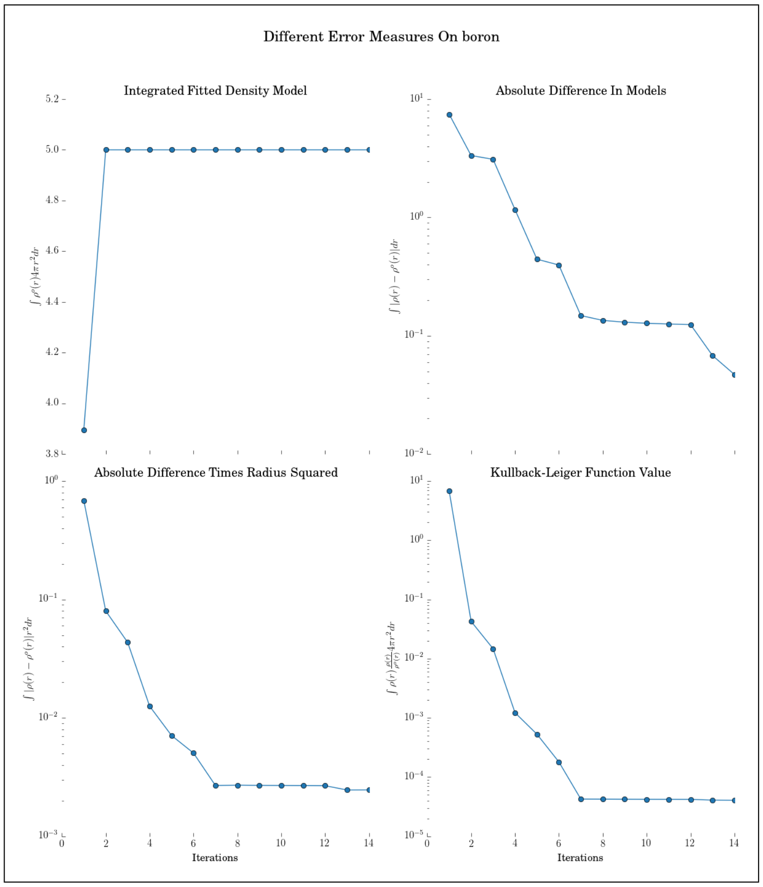
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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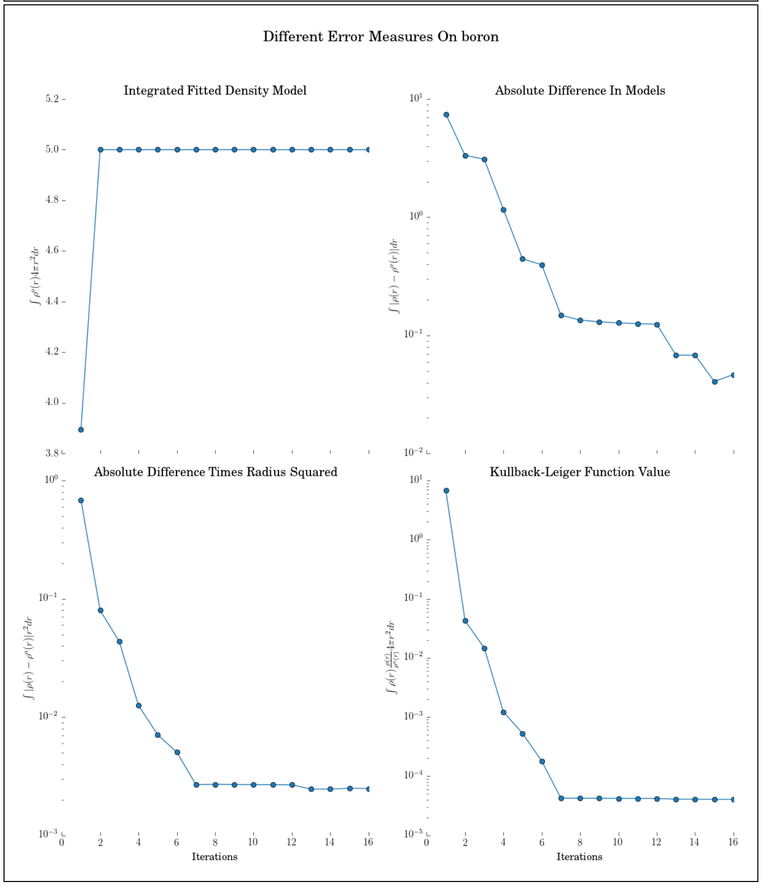
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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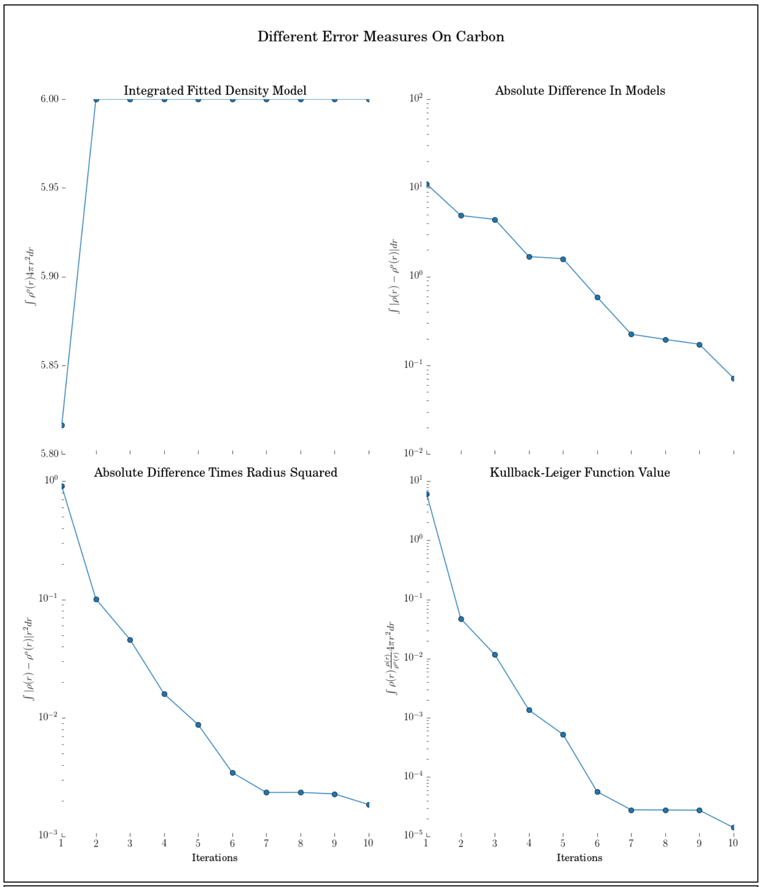
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

4.5 c



Different Error Measures On Carbon
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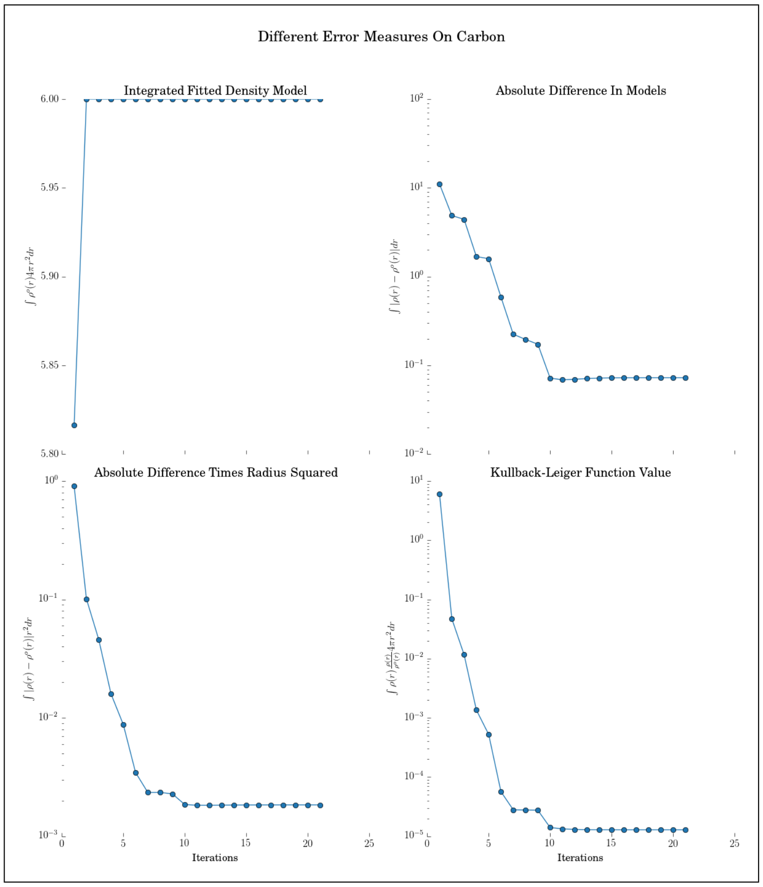
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations



Different Error Measures On Carbon
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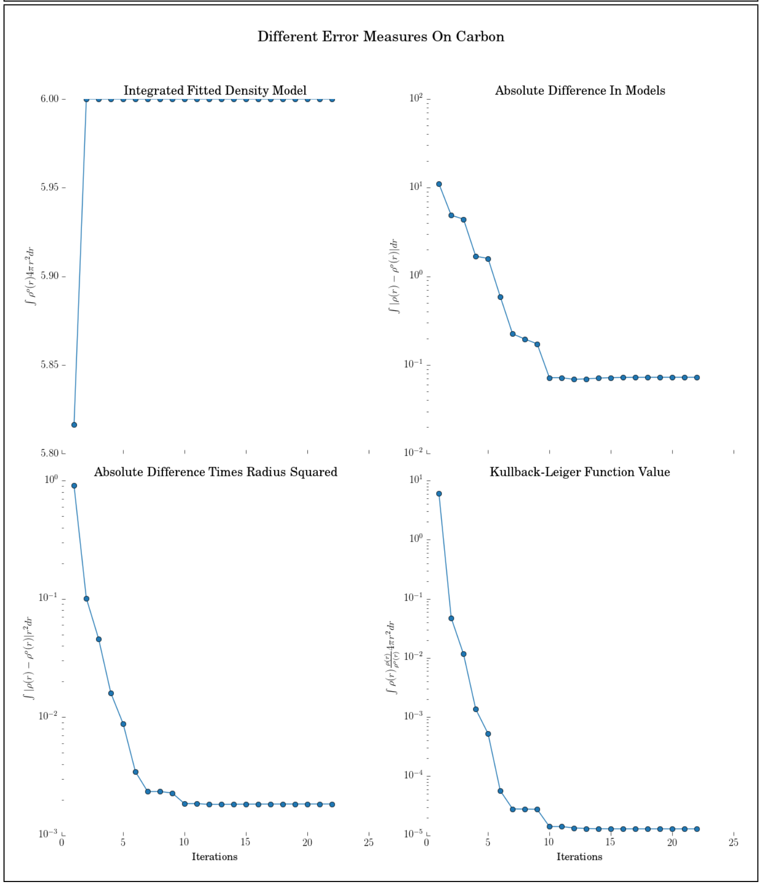
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations



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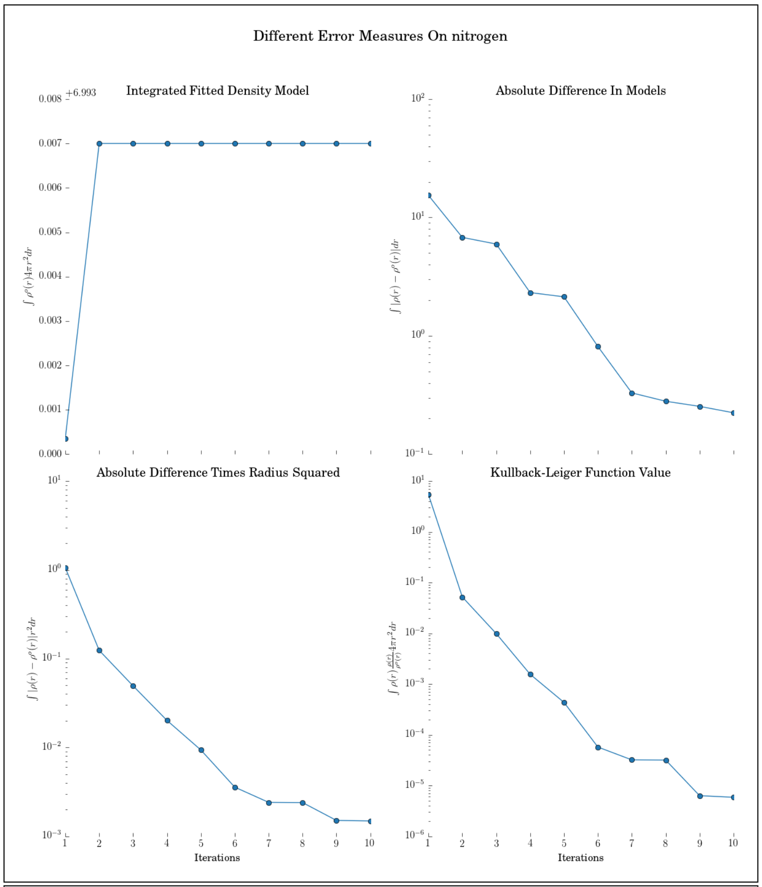
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations

4.6 n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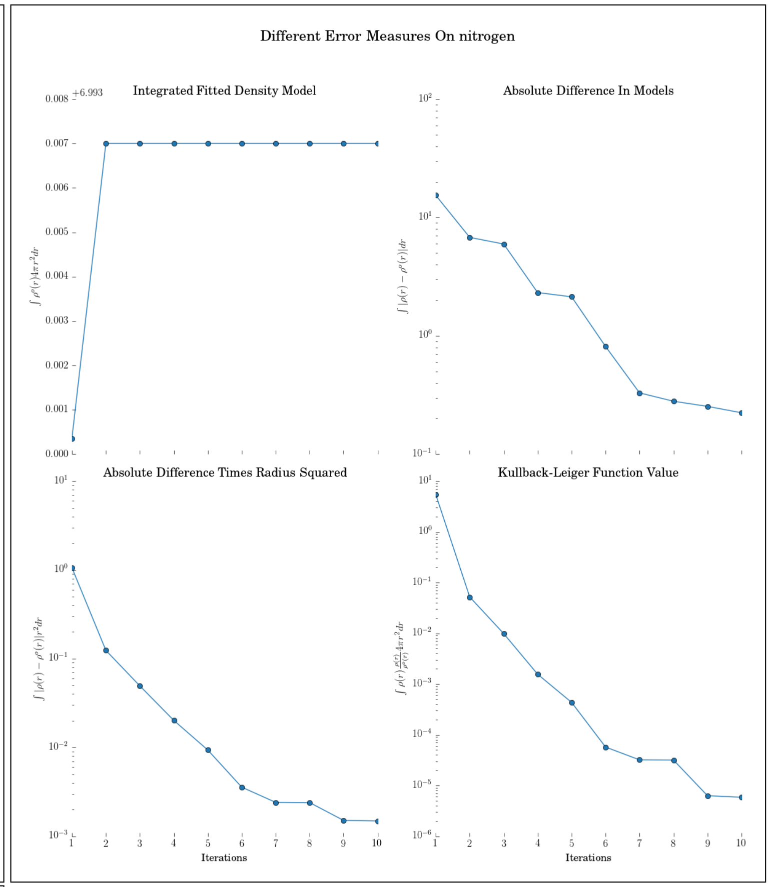
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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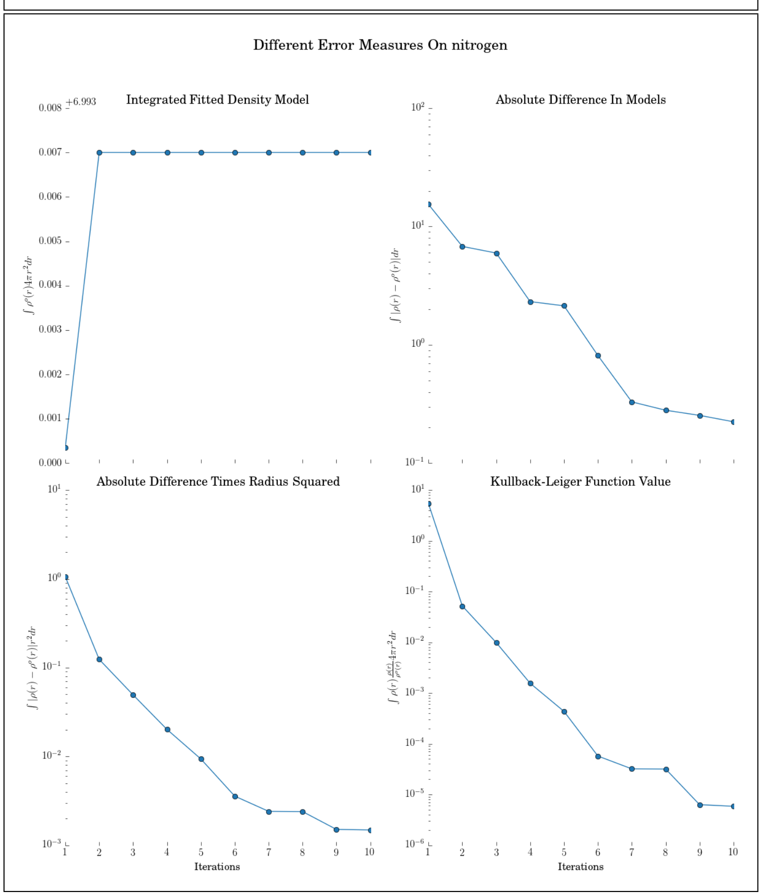
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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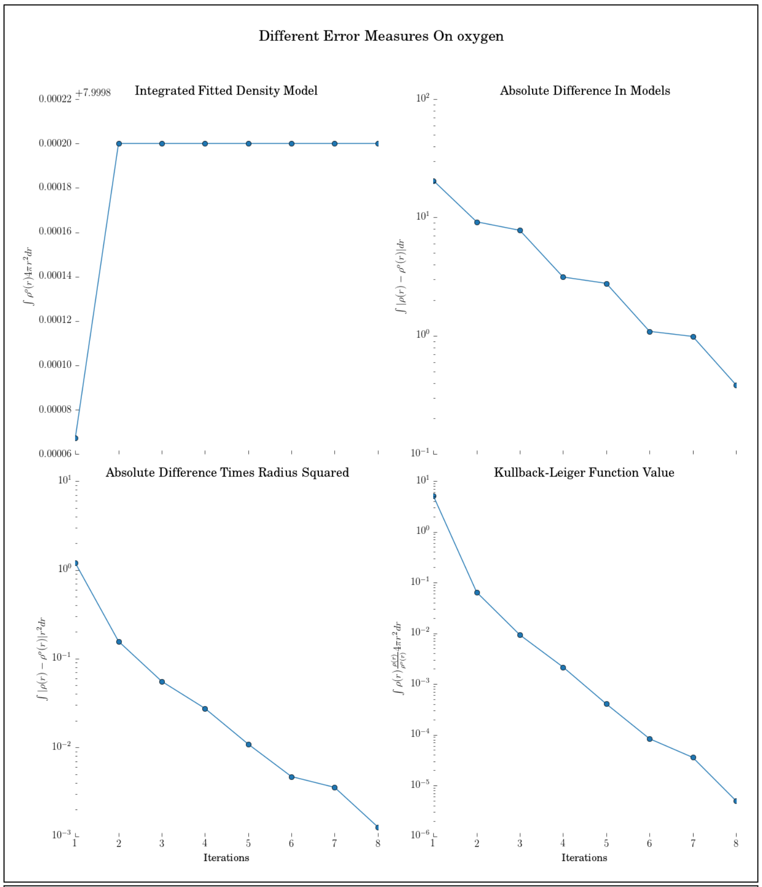
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

4.7 O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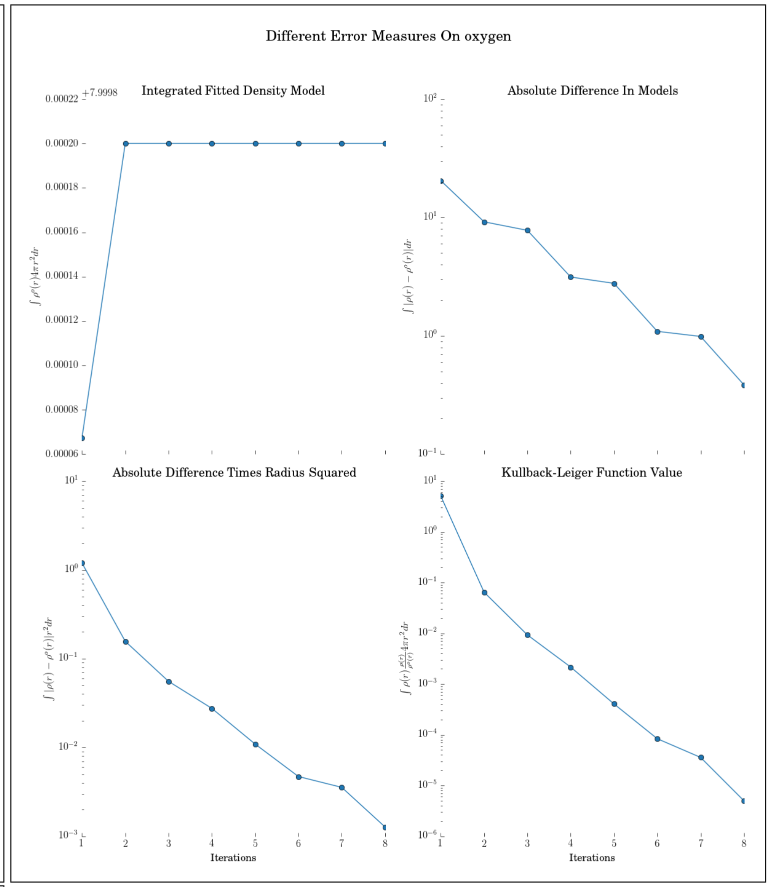
Kullback-Leiger Function Value
Iterations
Iterations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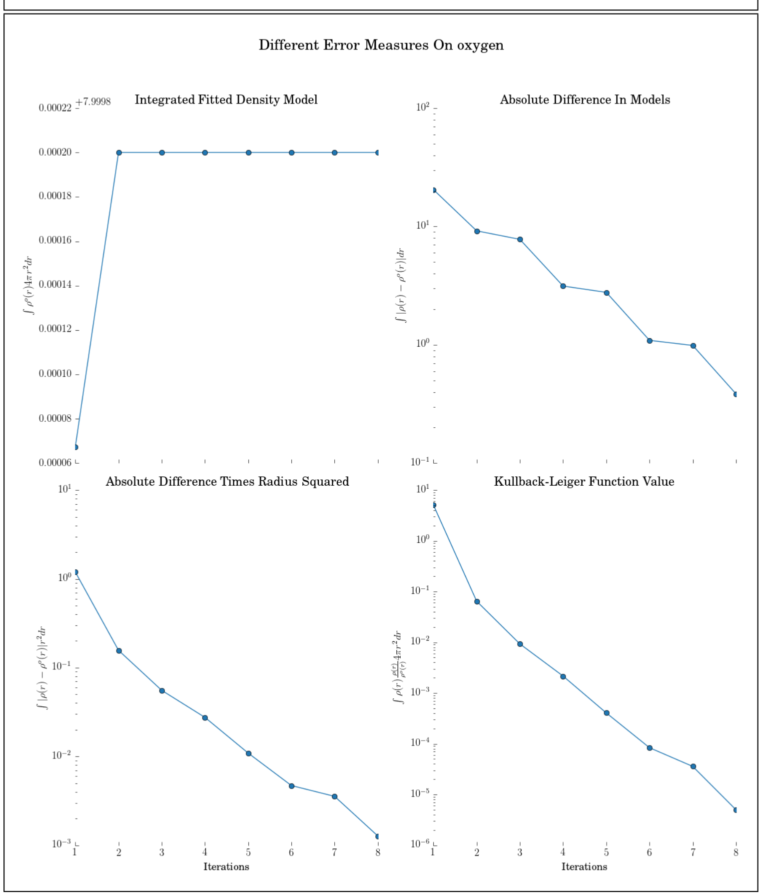
Kullback-Leiger Function Value
Iterations
Iterations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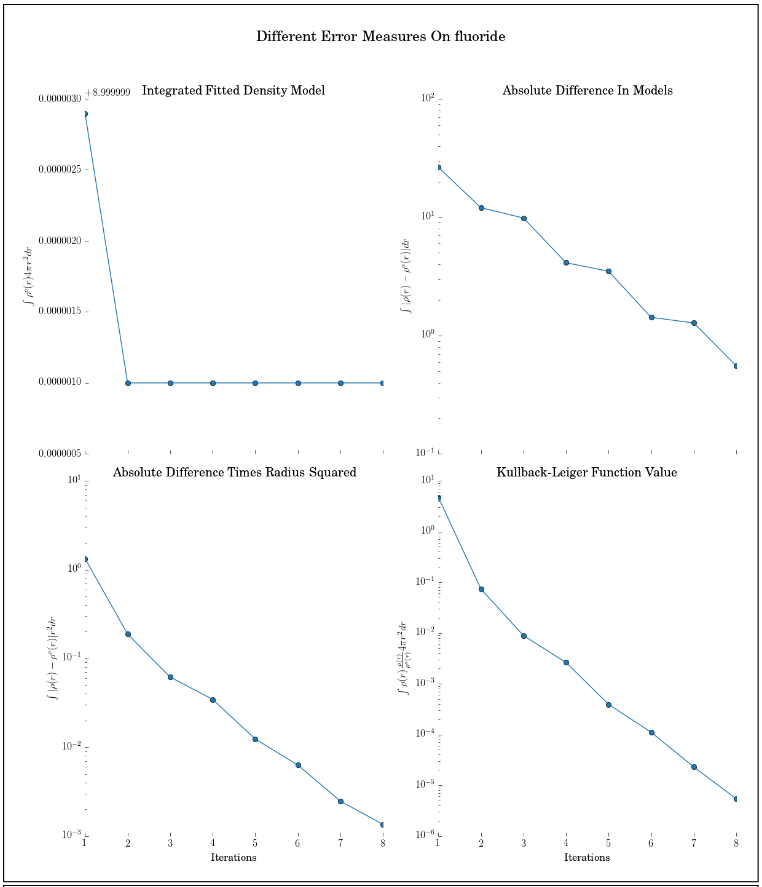
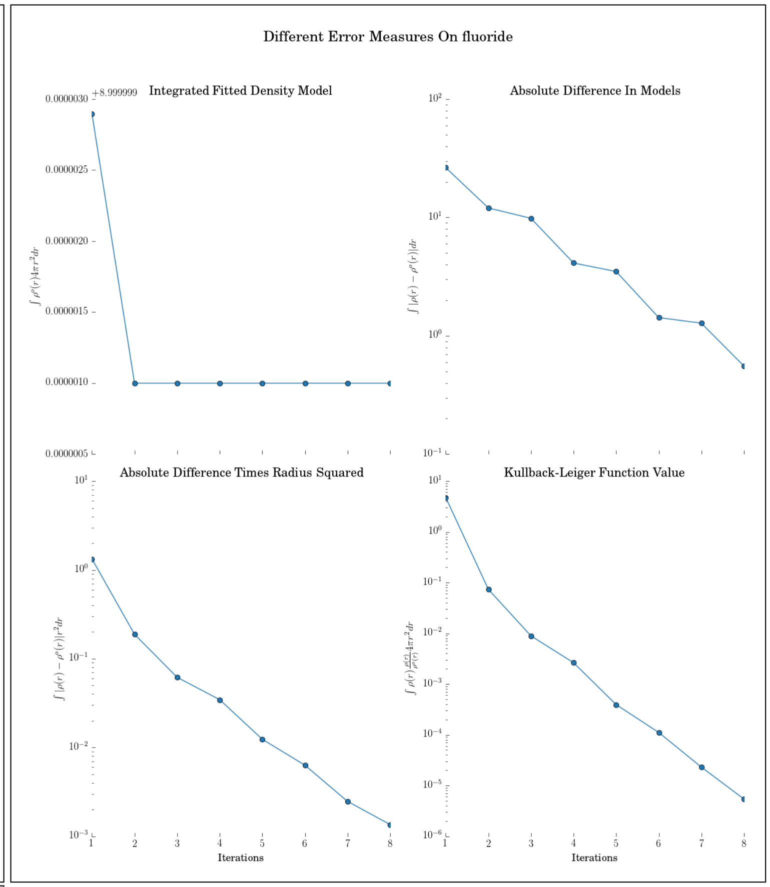
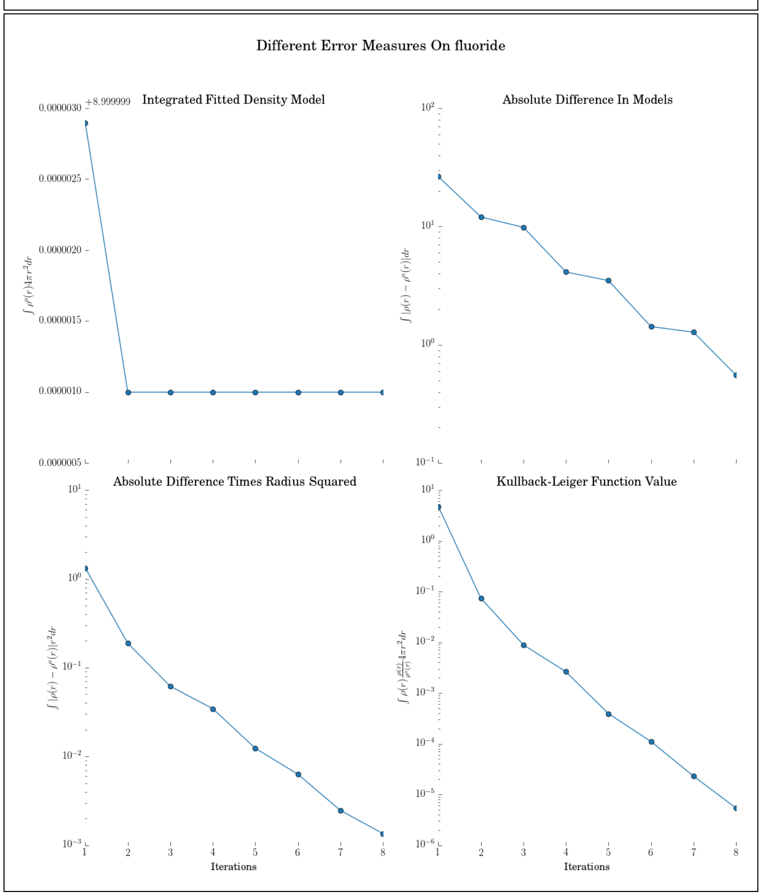
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

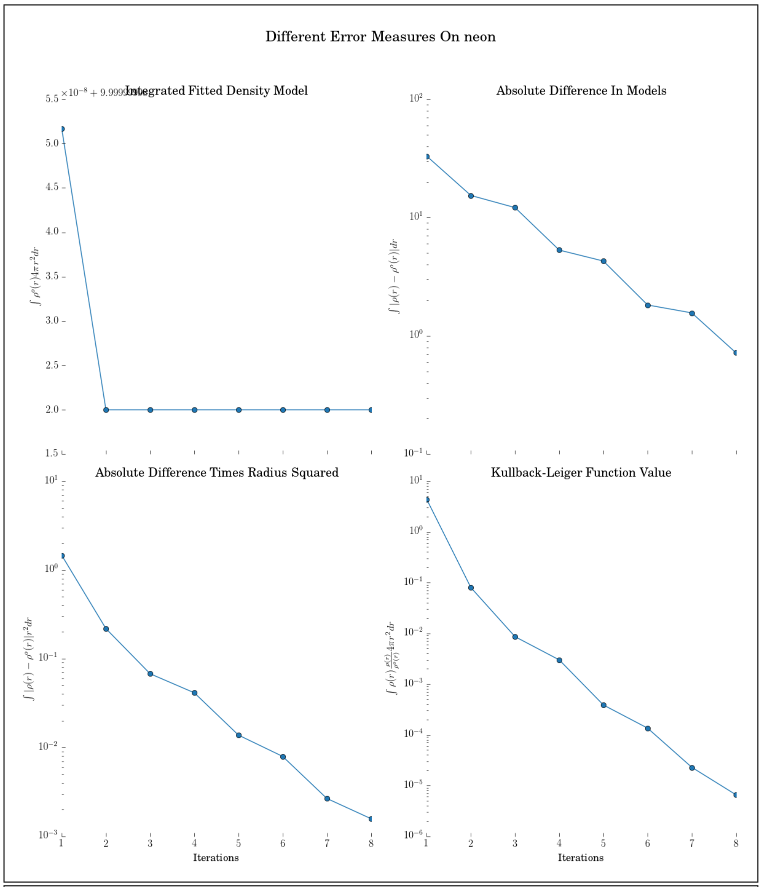
4.8 f


Different Error Measures On fluoride
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
+8.999999
Iterations
Iterations


Different Error Measures On fluoride
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
+8.999999
Iterations
Iterations


Different Error Measures On fluoride
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
+8.999999
Iterations
Iterations

4.9 ne



Different Error Measures On neon
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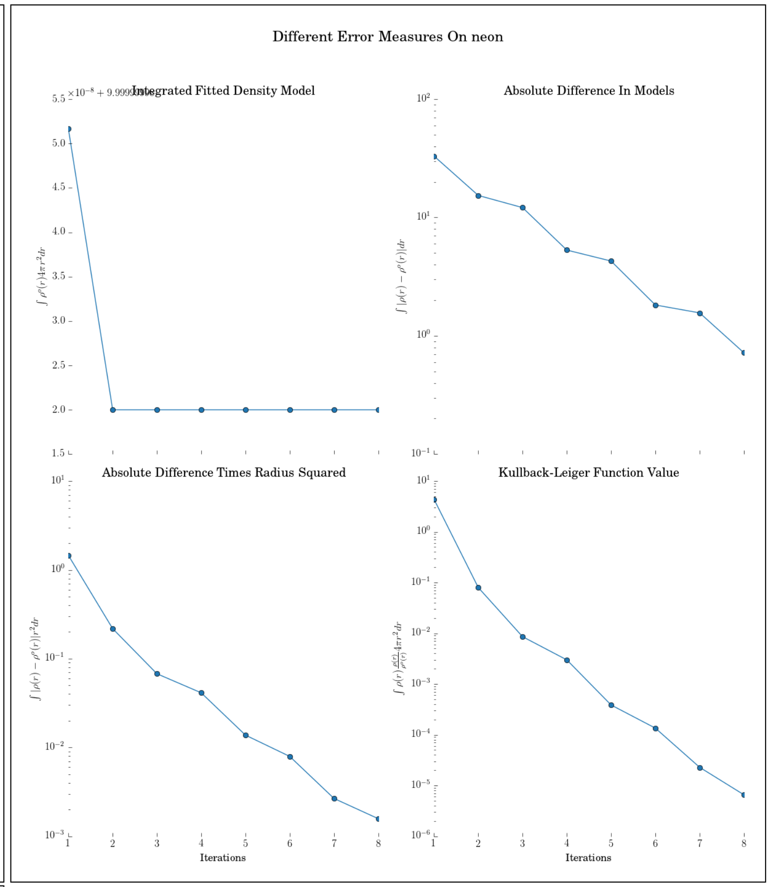
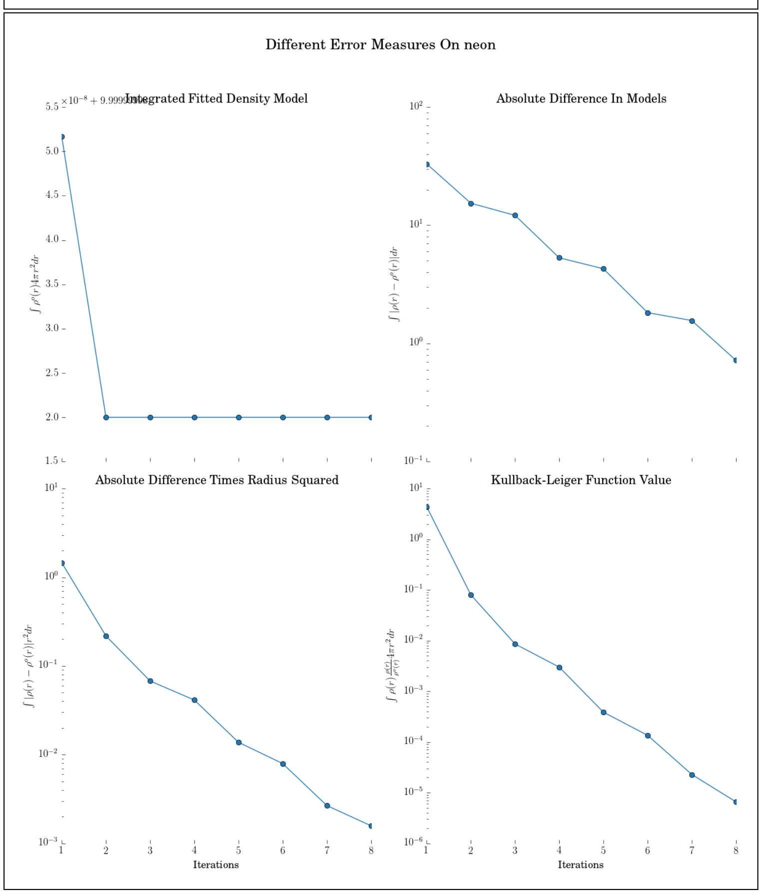
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations



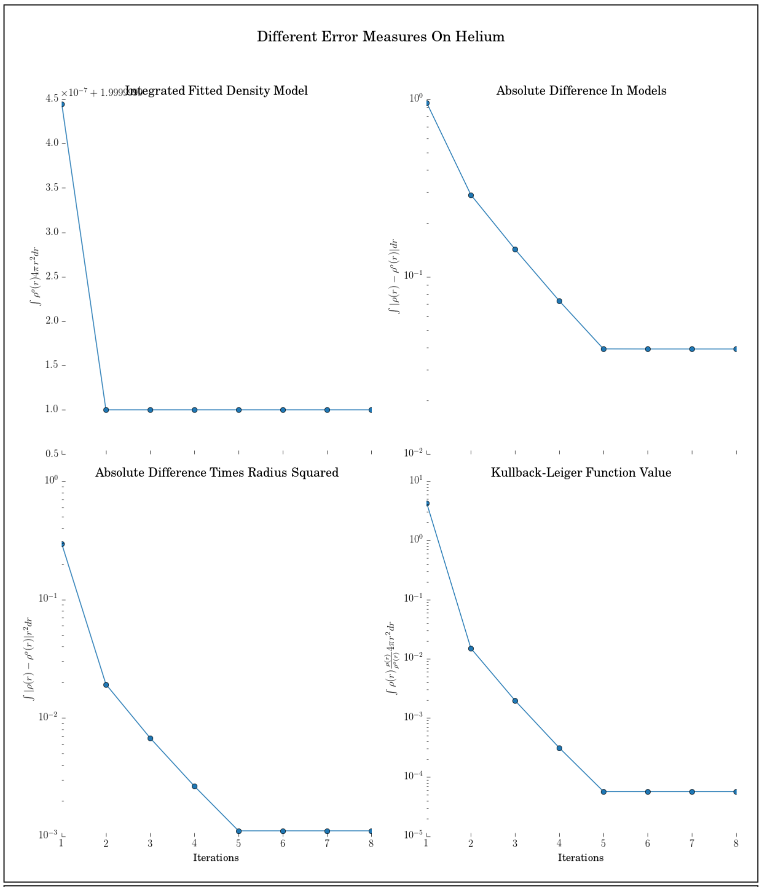
Different Error Measures On neon
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

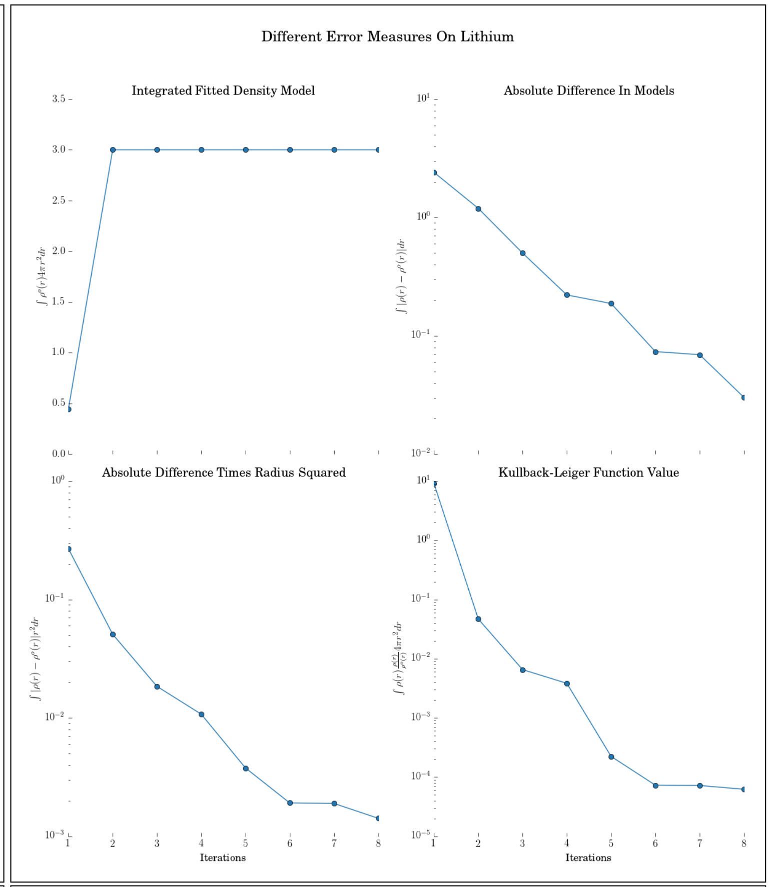


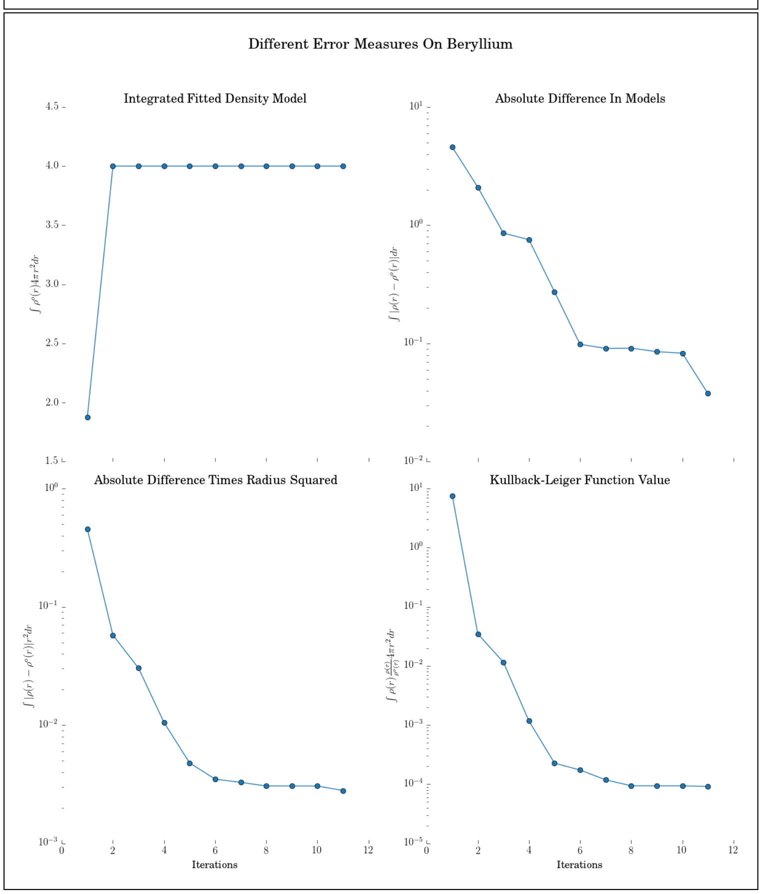
Different Error Measures On neon
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

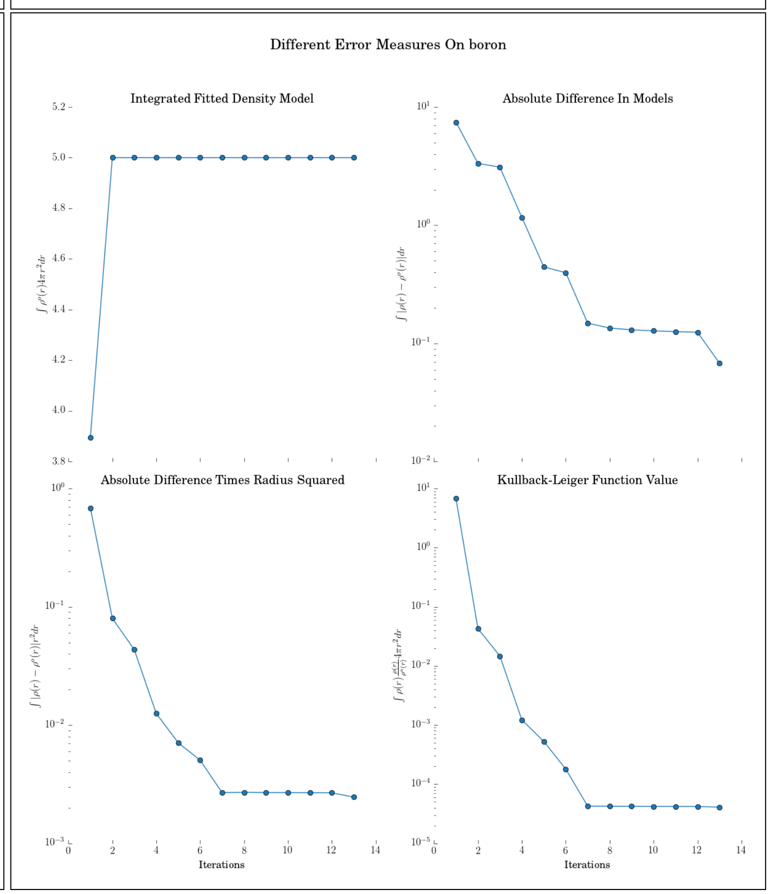
5 Plotting Grouped By Method

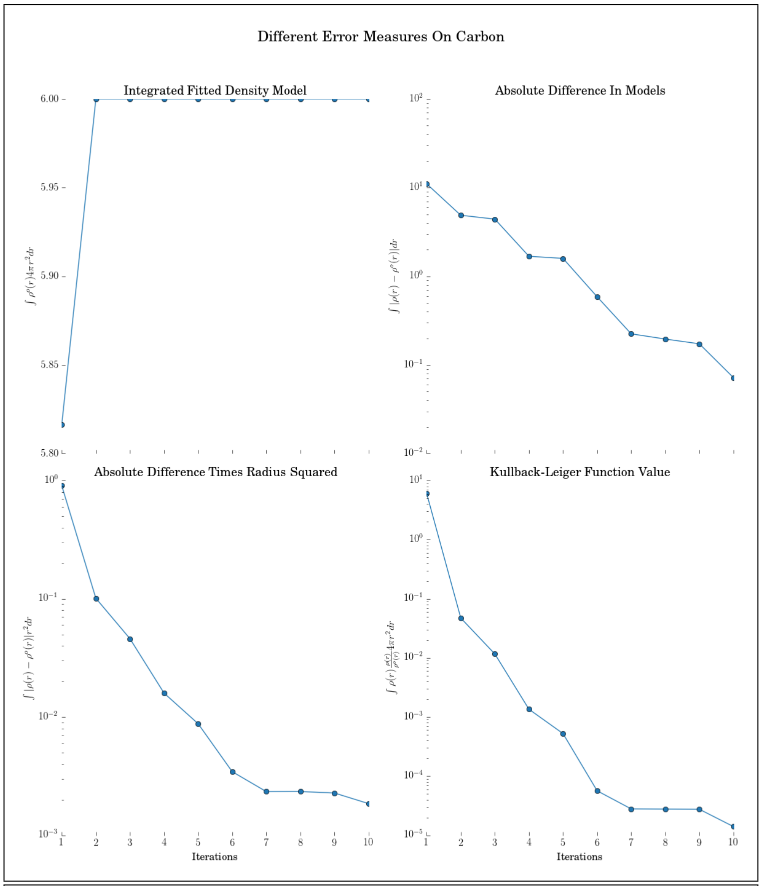
5.1 Results Plots







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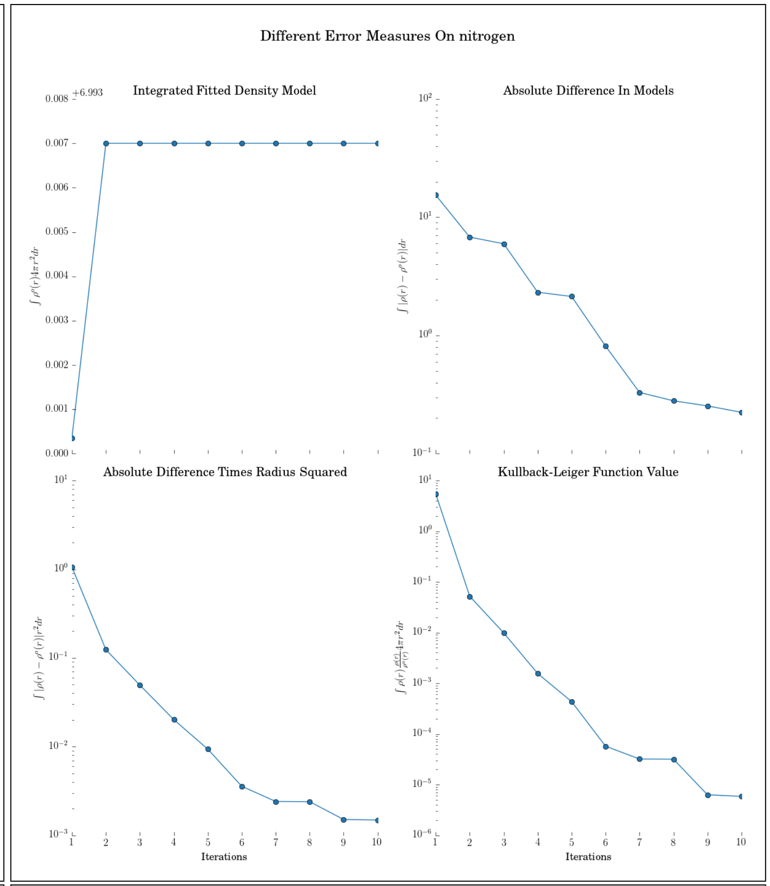
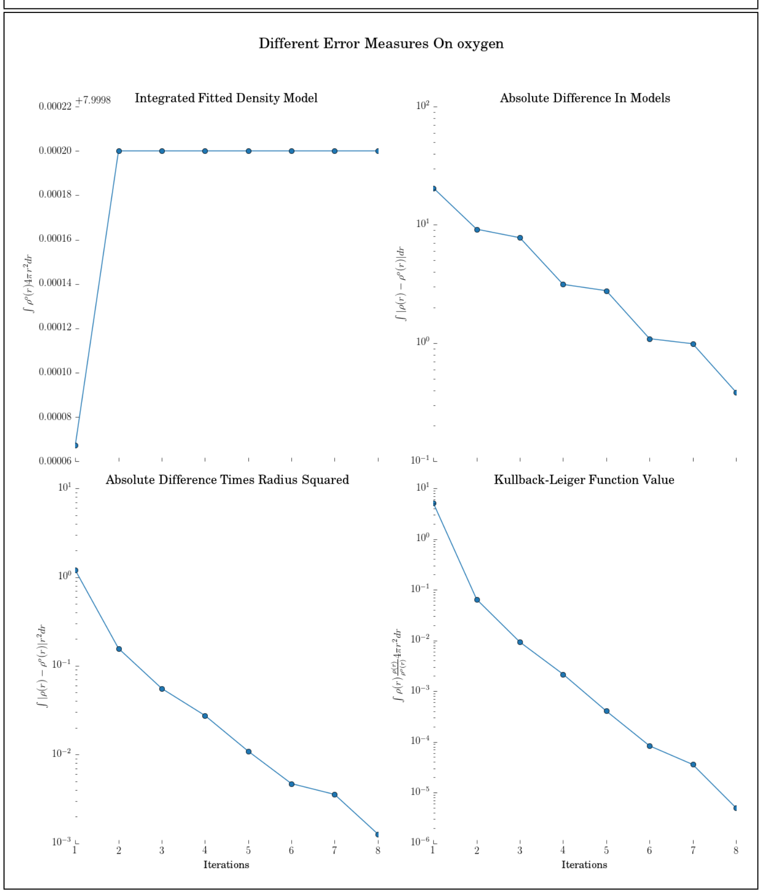
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations


Different Error Measures On nitrogen
+6.993
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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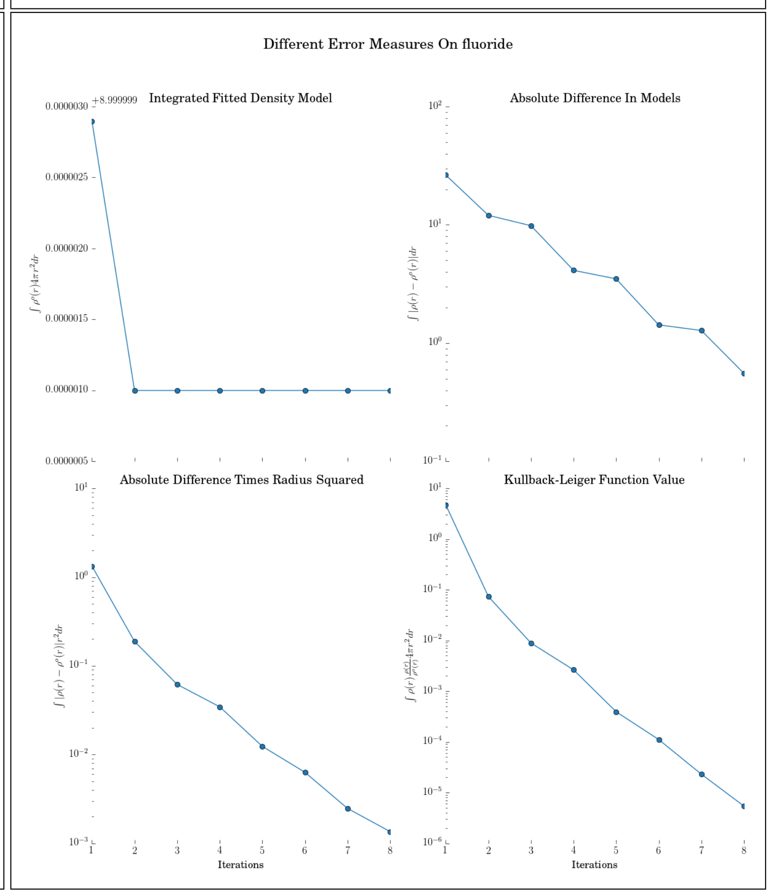
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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Integrated Fitted Density Model
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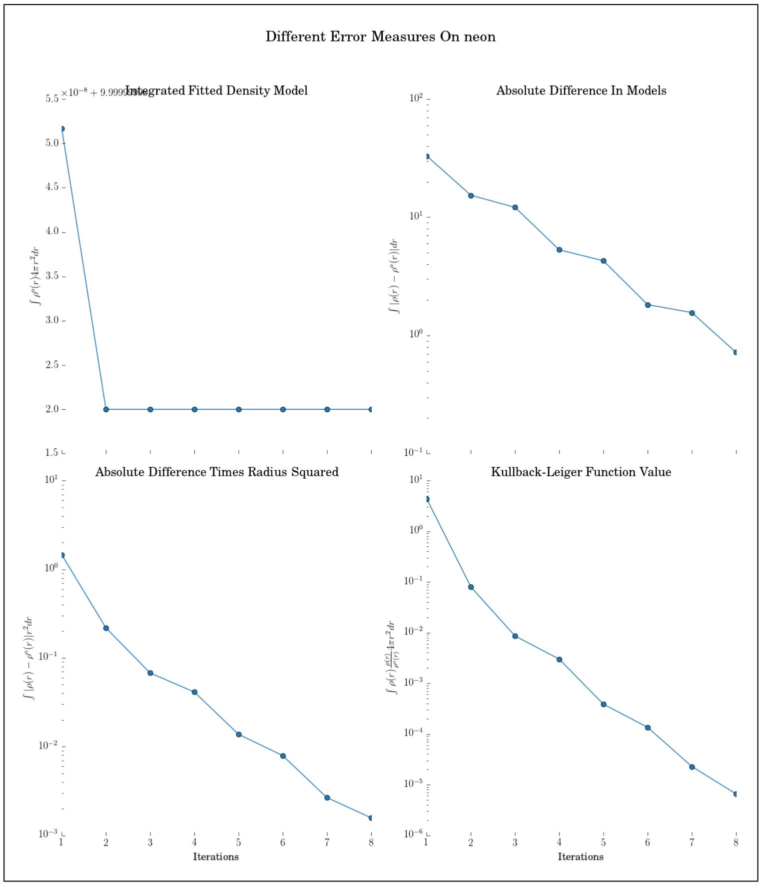
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations



Different Error Measures On neon
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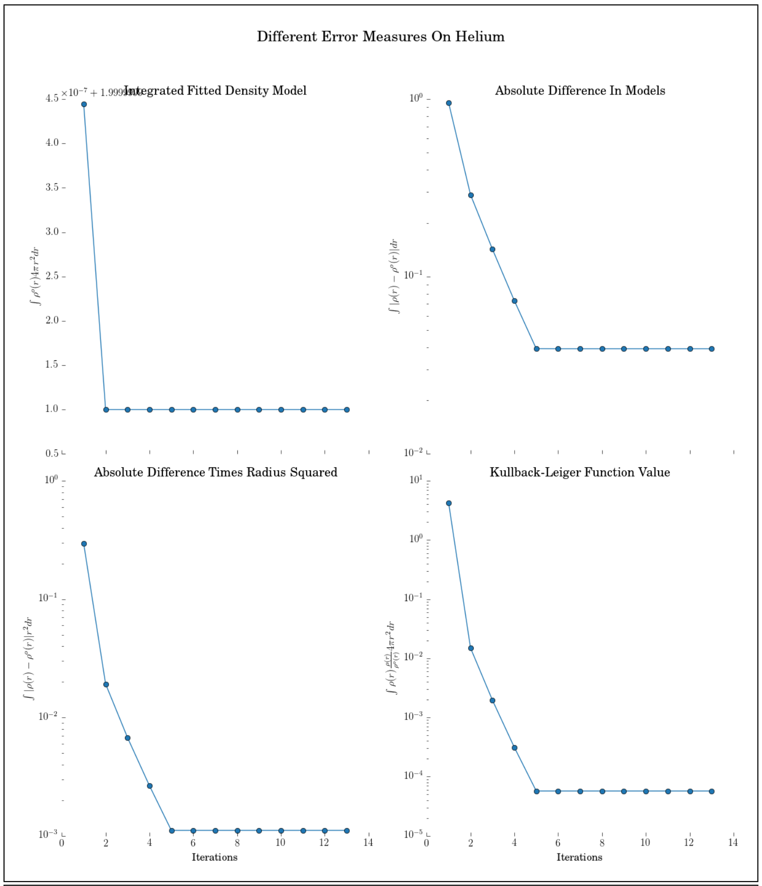
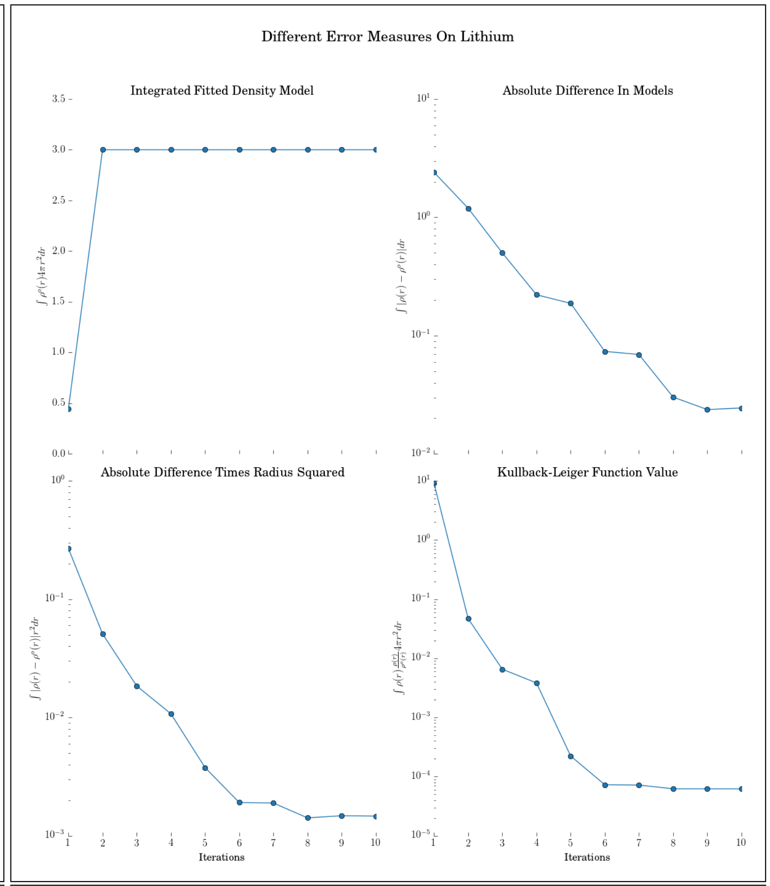
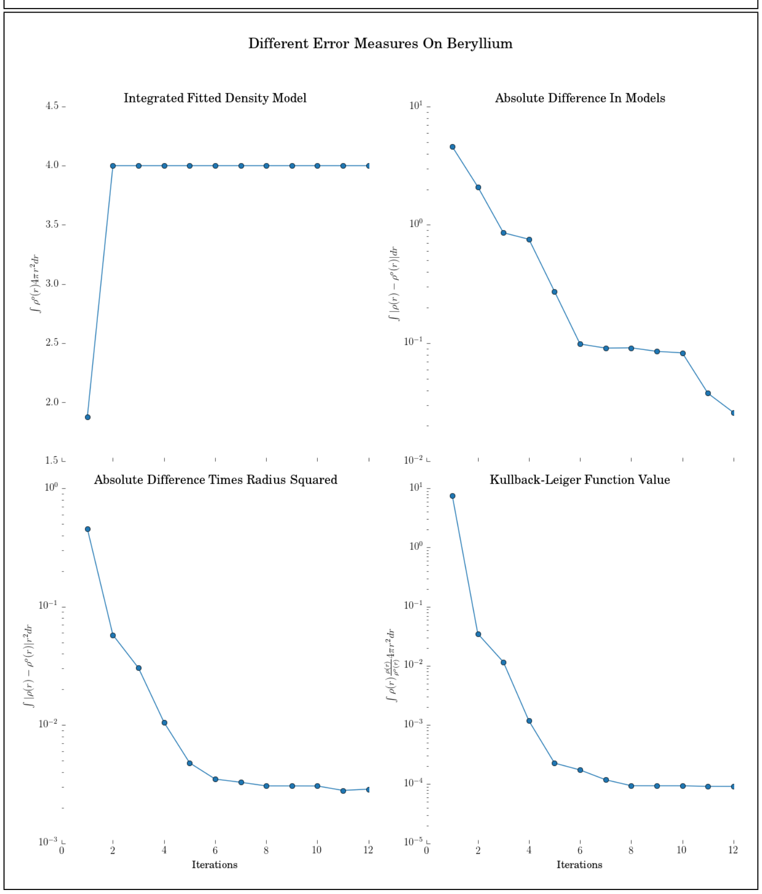
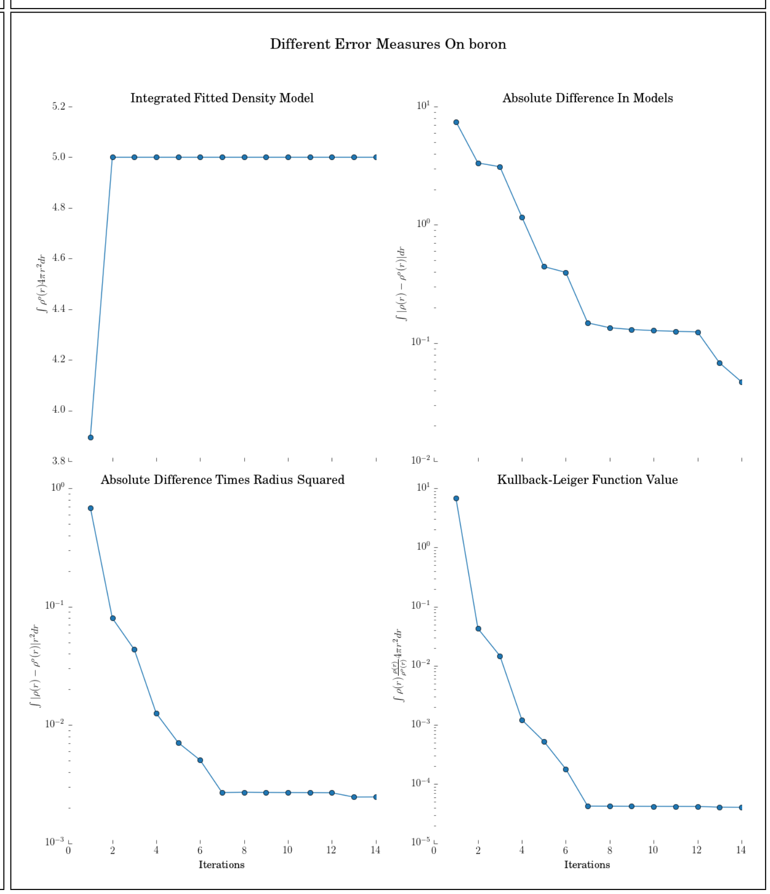
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

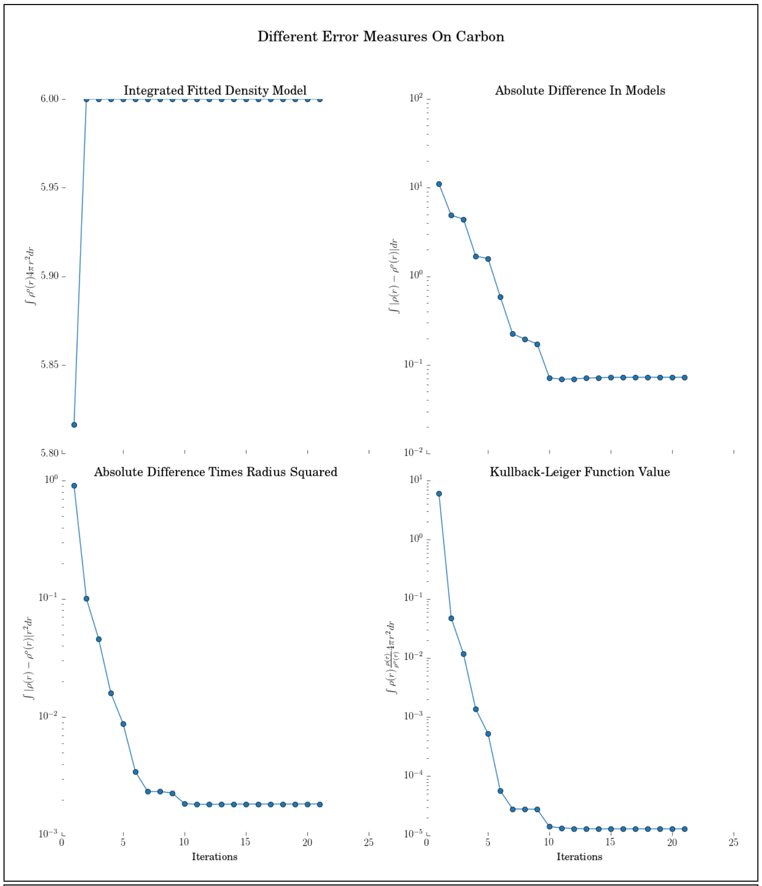
5.2 Results_Original Plots (X-Axis is Number of Basis Functions)

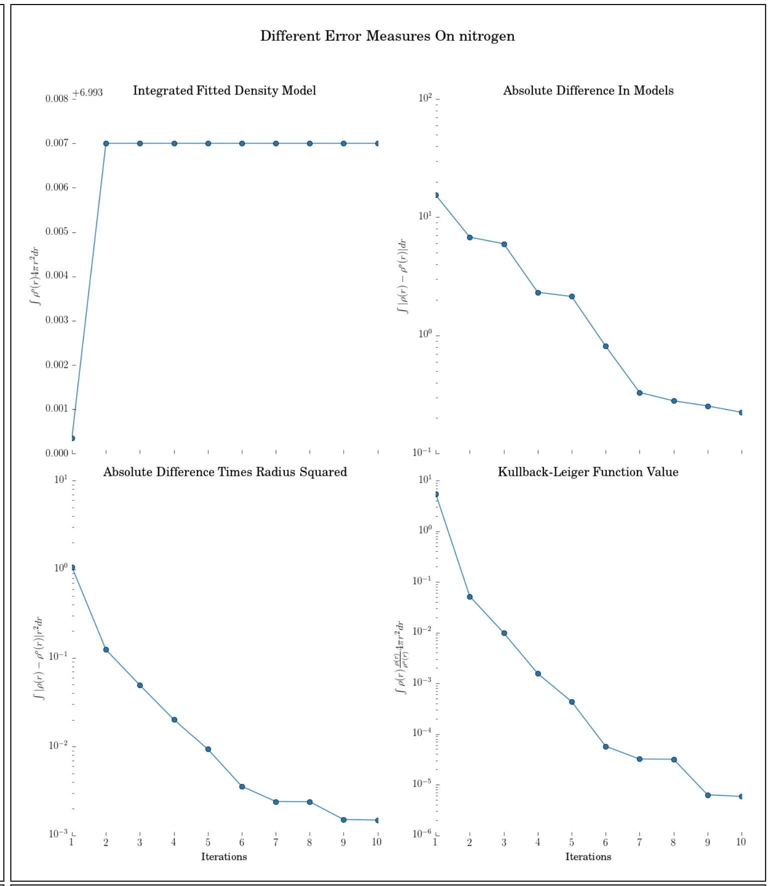









Different Error Measures On Carbon
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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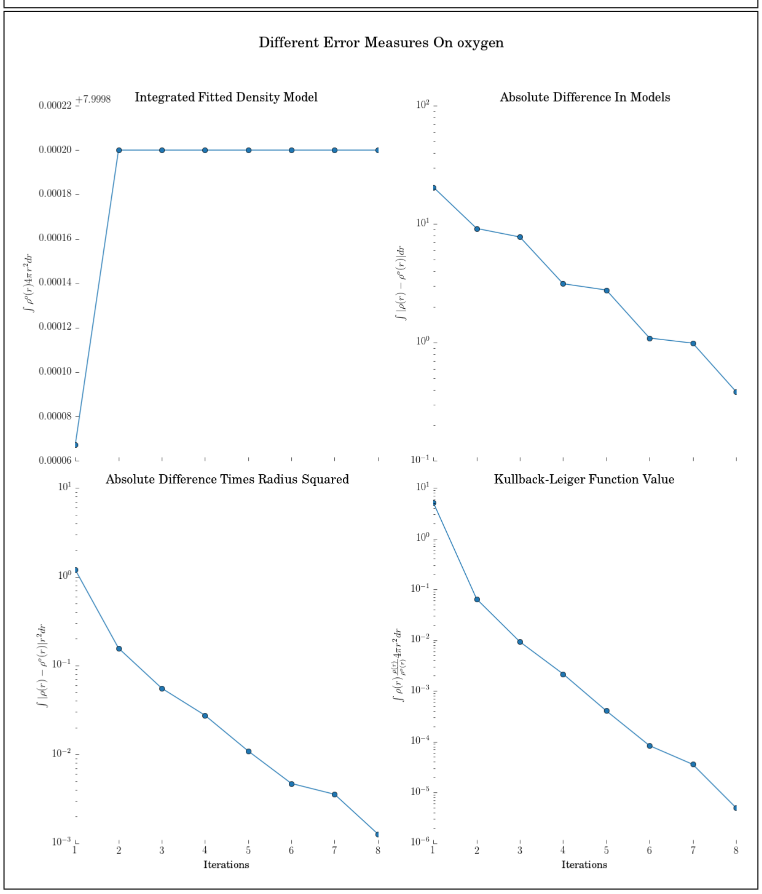
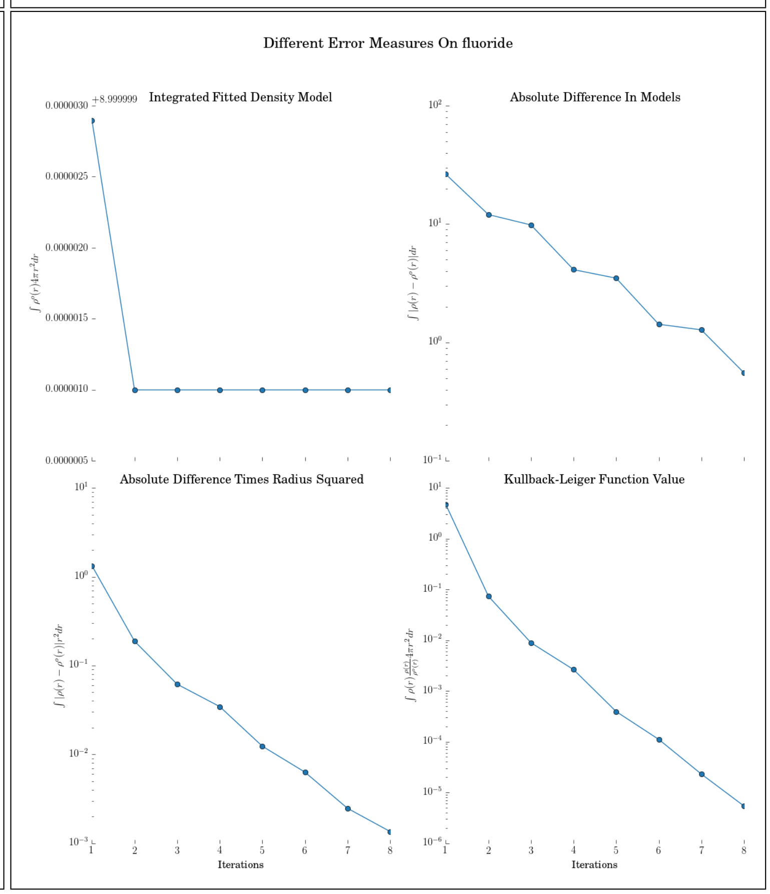
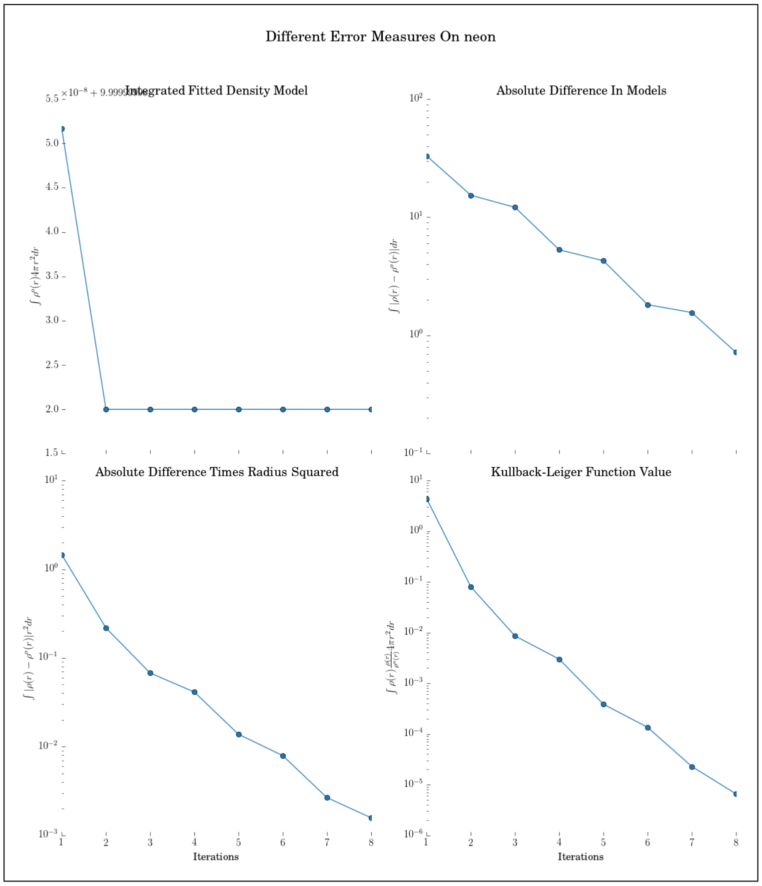
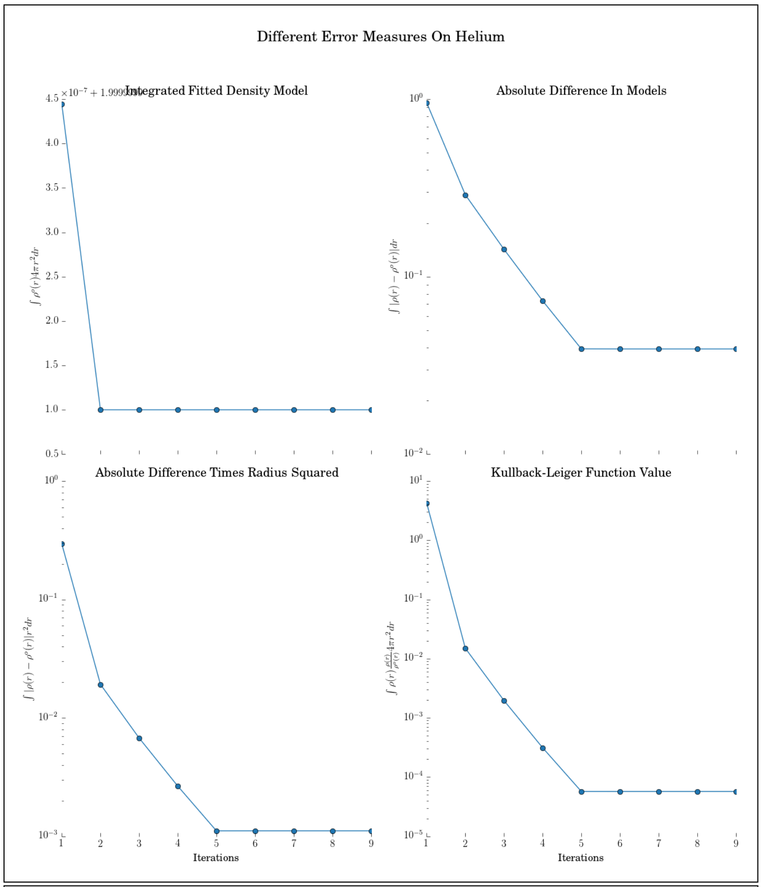
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

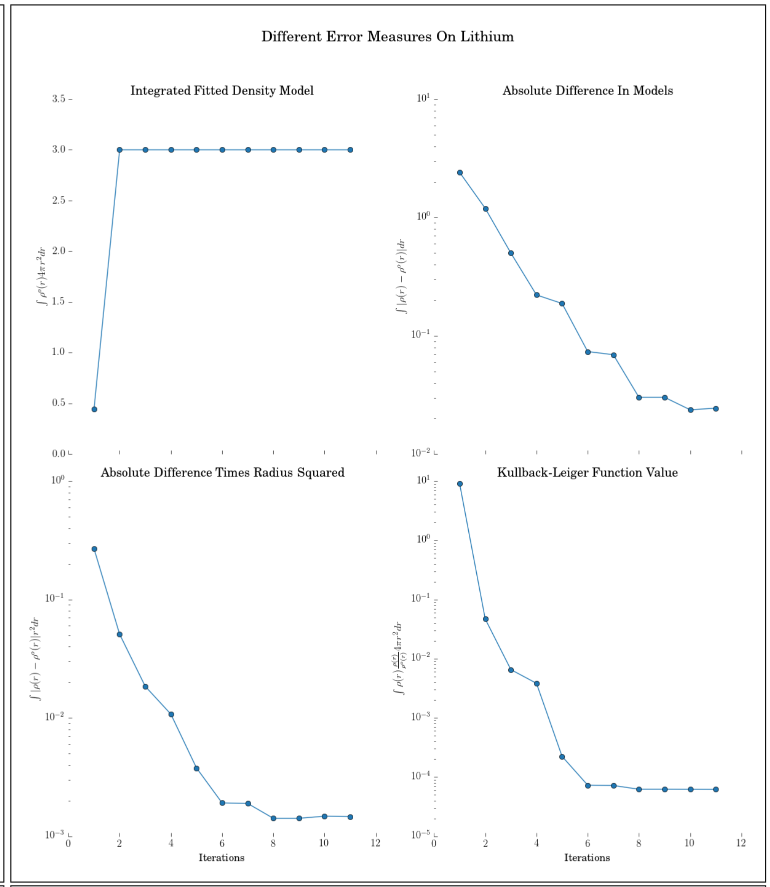

Different Error Measures On oxygen
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

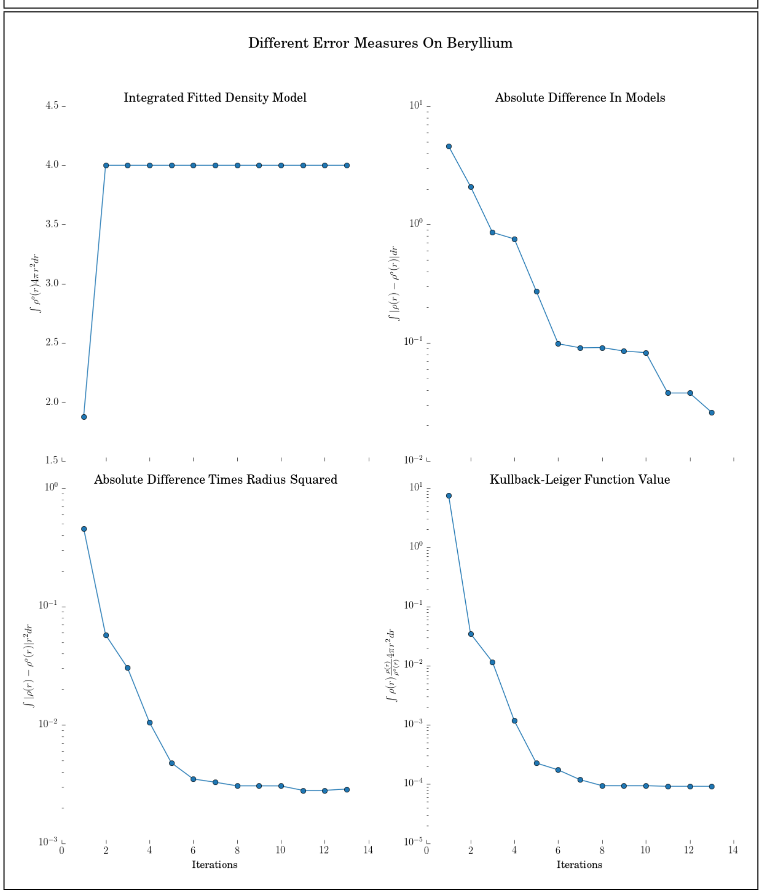

Different Error Measures On fluoride
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

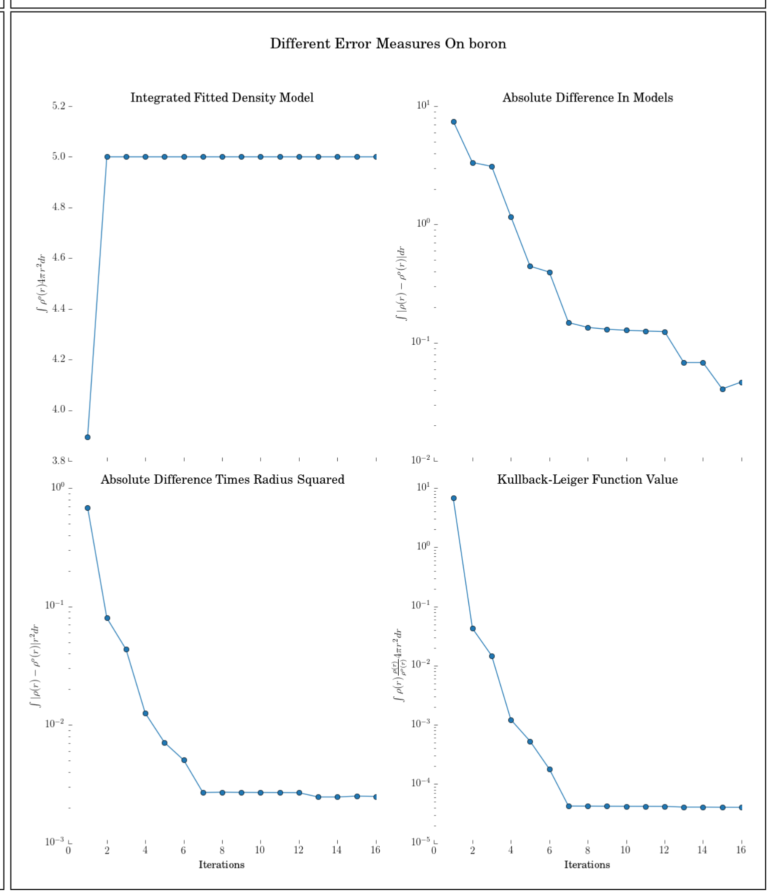

Different Error Measures On neon
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations

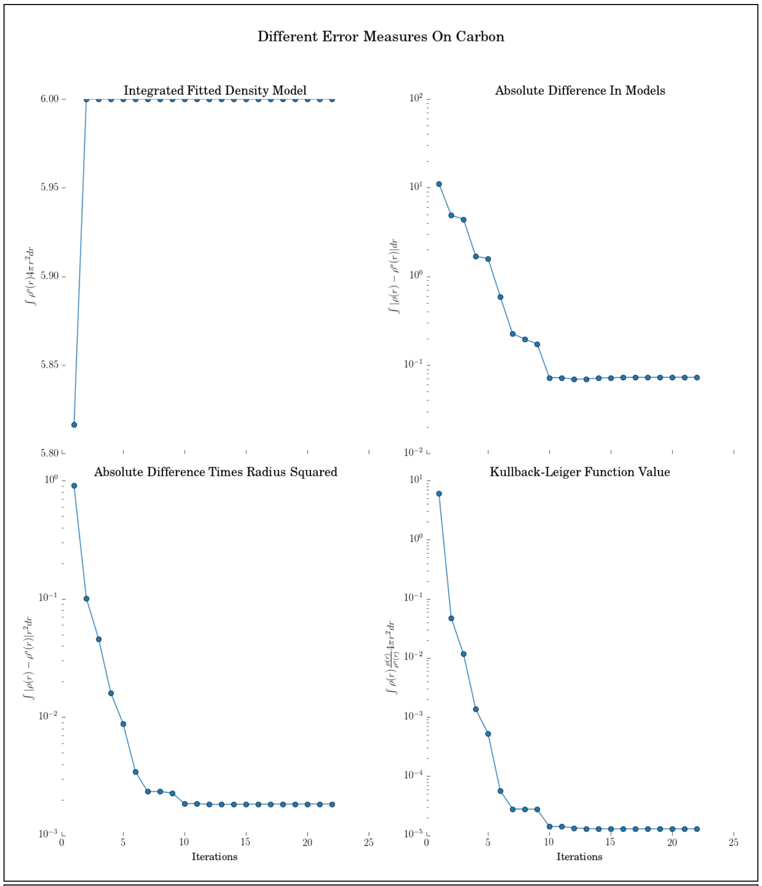
5.3 Results_Redundancies Plots

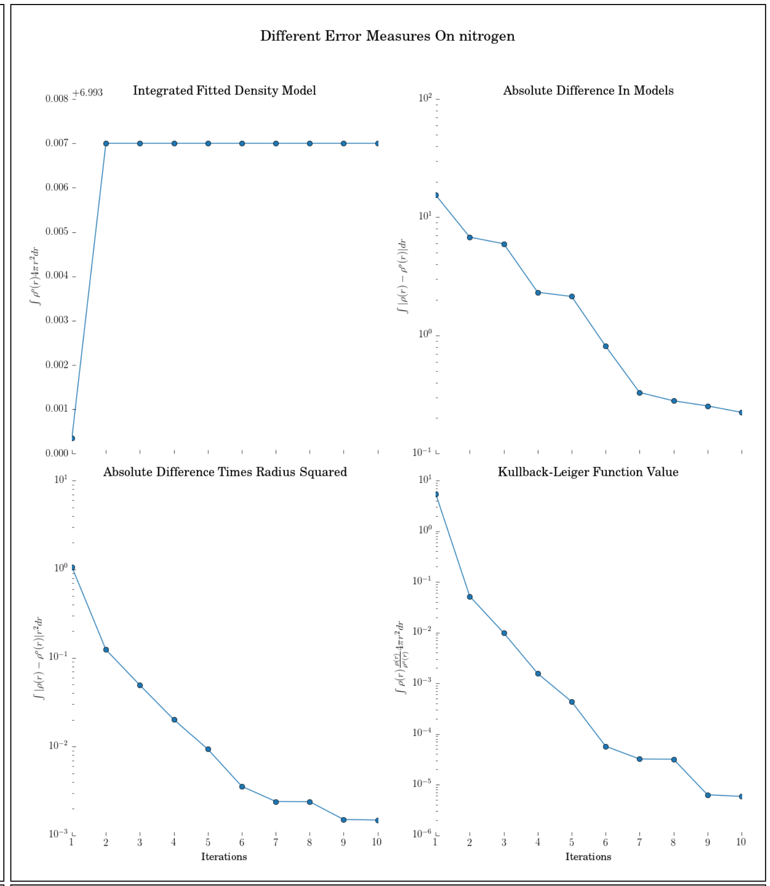









Different Error Measures On Carbon
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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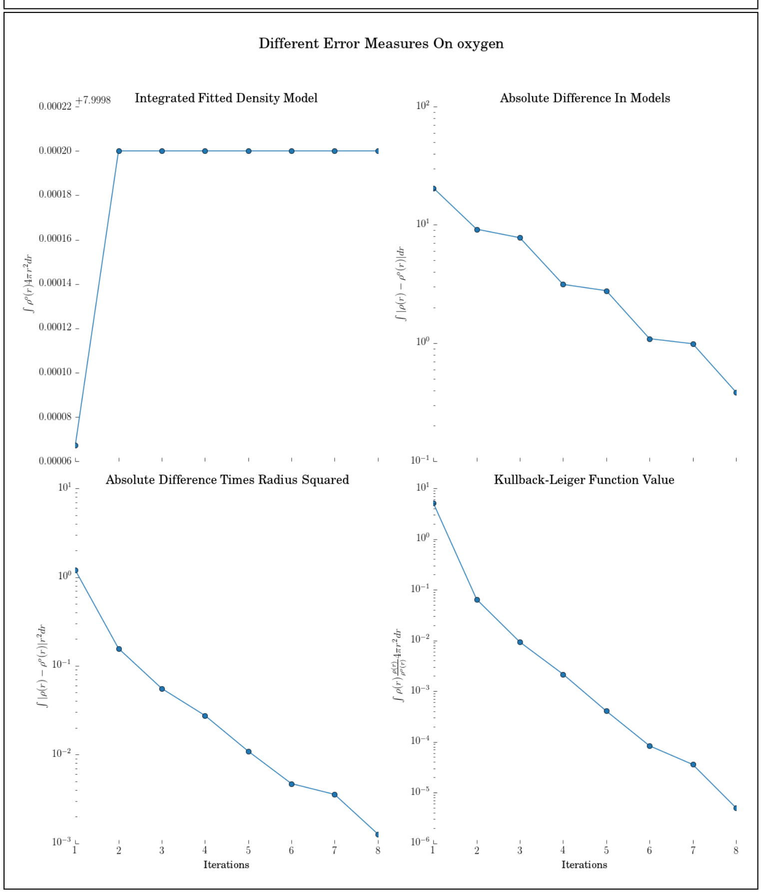
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations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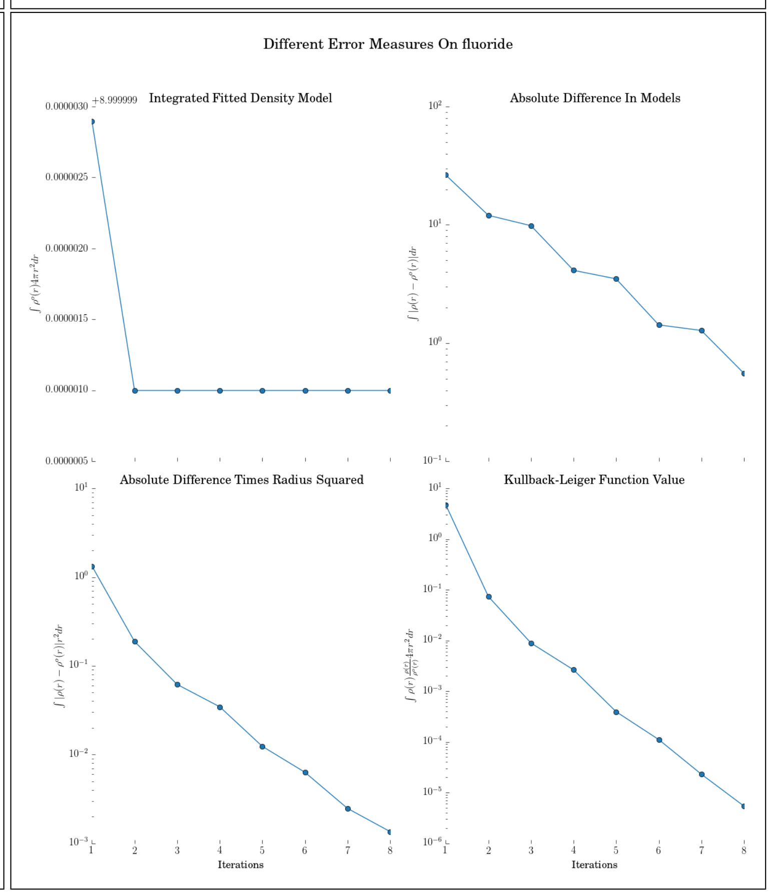
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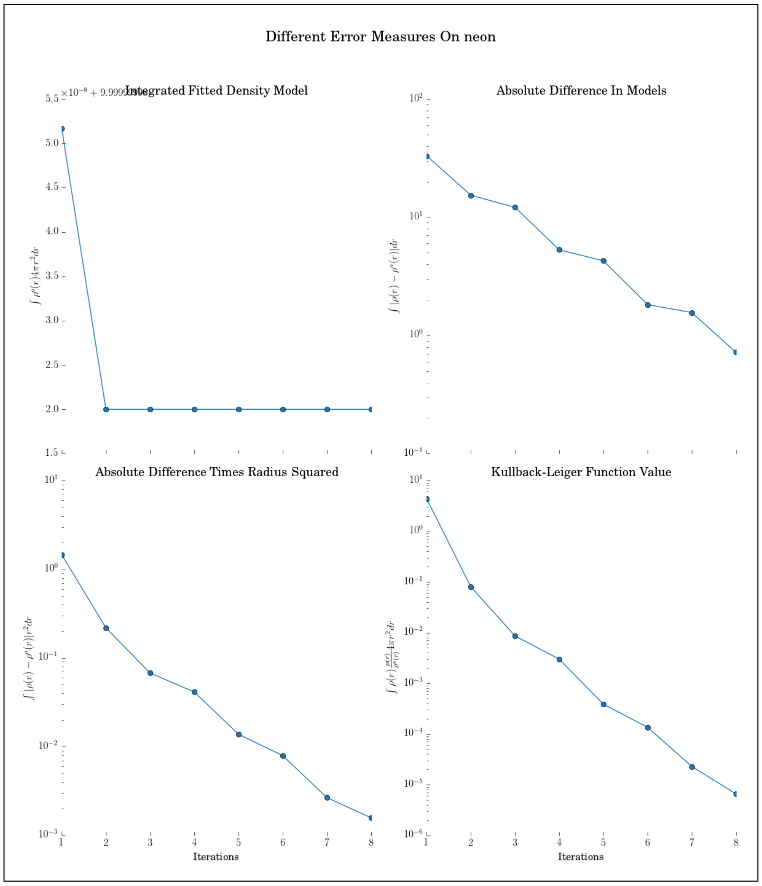

Different Error Measures On neon
Integrated Fitted Density Model
Absolute Difference In Models
Absolute Difference Times Radius Squared
Kullback-Leiger Function Value
Iterations
Iterations