

We study rigidity and stability of the BMS4 algebra and its centrally extended version. We construct and classify the family of algebras which appear as deformations of BMS4 and in general find the four-parameter family of algebras  $W(a,b;a',b')$  as a result of the stabilization analysis, where  $BMS4 = W(-1/2,-1/2;-1/2,-1/2)$ . We then study the  $W(a,b;a',b')$  algebra, its maximal finite subgroups and stability for different values of the four parameters. We prove stability of the  $W(a,b;a',b')$  family of algebras for generic values of the parameters. For special cases of  $(a,b)=(a',b')=(0,0)$  and  $(a,b)=(0,-1)$ ,  $(a',b')=(0,0)$  the algebra can be deformed. In particular we show that centrally extended  $W(0,-1;0,0)$  algebra can be deformed to an algebra which has three copies of Virasoro as a subalgebra. We briefly discuss these deformed algebras as asymptotic symmetry algebras and the physical meaning of the stabilization and implications of our result.